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EDITORIAL — SOME HIGH LIGHTS

General Economic Scene

State

Perspective Plan: In addition to the perspective plans for Education, Science and Technology and for Health, Family Planning, Nutrition and Sanitation summarised in Vol. II No. 9 of the Bulletin, four other sectoral plans have been finalised, presented to the Chairman and released for discussion. The Agricultural sector plan calls for Rs. 900 crores investment during the 12 year period 1972-84. Extending the HYV, rice production is to be increased from the current 53.03 lakh tonnes in 1970-71 to 76.5 lakh tonnes by 1983-84 and total food grains production expanded from 70.30 lakh tonnes to 111.50 lakh tonnes. Under millets, the area under maize will be increased from 18,000 hectares to 2,00,000 hectares to aid maize based industries. Special emphasis is to be placed on pulses which is to be increased seven fold to meet our serious deficit situation by concentrating on short term varieties and increasing the cultivated area under pulses from 4,55,000 hectares in 15,74,000 hectares. Another major expansion is the growing of oil seeds which is to be expanded from the current 10 lakh tonnes to 16.85 lakh tonnes in 1978-79 and to 23.03 lakh tonnes in 1983-84. In particular sun-flower will be grown over 1.5 lakh hectares during the Fifth and over 3 lakh hectares during the Sixth Plan along with using 25 per cent of cotton seeds for oil production. Cotton production will also be expanded to 9.2 lakh bales by the Fifth and 11.88 lakh bales by the Sixth Plan. 12 additional sugar factories are to be established during the perspective plan period in order to treble the State production of sugar from 2.99 lakh tonnes to 9.25 lakh tonnes. Increases are also proposed in the capacity of the existing mills and in the production of coconuts. A State Seeds Corporation is proposed to produce and market certified seeds and to enforce quality controls on fertilisers and pesticides supply. Plantation crops are to be expanded, tea by 6,000 hectares, coffee by 1,400 hectares and rubber by 2,000 hectares, in addition to the projects proposed by the Forestry Plan. On irrigation, the plan envisages an extension of the irrigated area by 12.70 lakh hectares which includes conjunctive use of surface and underground water over 3.5 lakh hectares. The Rs. 900 crores finance would be provided about half by cooperative and commercial banks and the other half by land development banks and commercial banks. These sources of finances need further examination given the record of cooperative institutions to date. Also too much of the plan is set forth in terms of physical targets—the institutional and motivational forces need further study and amplification. The plan aims at doubling agriculture's contribution to the State income and providing 14 lakh additional jobs—if the plan is effectively executed.

The fisheries sector perspective plan aims at (a) trebling the domestic consumption of fish from the present poor 5.87 kg. annual per capita consumption which would be a major means of combating our protein deficiency, (b) quadrupling the contribution of this sector to the State income, (c) increasing foreign exchange earnings, (d) generating employment for skilled and semi-skilled workers in fisheries and fish based industries

and (e) improving the living conditions including housing of the small and medium fishermen. For this, the current fish production is to be increased from 2.8 lakh tonnes per annum to 5 lakh tonnes by 1974, to 7.3 lakh tonnes by 1979 and to 12.4 lakh tonnes by 1984. The plan provides for fitting out-board motors to catamarans, in-board motors to indigenous craft, improved gear and use of intermediate technology in traditional fishing, construction of mechanised fishing boats for fishermen, cooperatives and private enterprises. 100 large vessels during the Fifth Plan and 200 during the Sixth Plan are to be commissioned. These and the construction of major fishing harbours at Madras, Tuticorin, Colachel and Mandapam and landing and berthing facilities at minor ports at Ennore, Porto Novo, Vallinookan, Point Calimere, Chinnamuttam etc. are also proposed. The expansion of inland fisheries will be ensured by both increasing existing fish farms and creating additional breeding centres and the stocking of fish seed for feeding all cultivable water sources. Trout farms are to be expanded and established in the Nilgiris and Kodaikanal for commercial production and sale. This whole programme calls for an investment of Rs. 200 crores during the perspective plan period, with Rs. 86 crores during the Fifth Plan, more than half of which will be financed by the Union Government.

The perspective plan for animal husbandry proposes a Rs. 216 crores programme to increase the output in milk, meat and eggs in the State. Milk production will increase from 1,000 million kg. to 6,000 million kg. involving an increase in per capita milk consumption from the current 63 gms. to 300 gms. Production of eggs will increase from one million to nine million eggs per day, raising per capita annual consumption from the present 8 eggs to 60. For this, 1,500 rural egg production and marketing centres, 90 hatcheries and 40 food mixing units will be established. Cattle improvement will call for two more livestock farms and 3 units for introducing frozen semen techniques which will store the massive import of exotic germ and ensure extensive application of artificial insemination. Twenty ambulatory clinics will deal with the problem of cattle sterility, a major constraint to milk production increase, diagnostic laboratories with mobile squads will provide veterinary services to superior quality animals and 12 testing units for milch herds will be set up to fight communicable diseases. 70 new veterinary units will be established to provide veterinary facilities in all towns, plus 2 dispensaries in each Block and 1,000 sub-centres to provide first aid. An immunological laboratory to prevent and check reindeerpest and foot and mouth diseases is proposed to be established at Ranipet, on the campus of the Institute of Veterinary Preventive Medicine. Cattle shows, the intensive development of fodder crop by increasing the present 700 acres under sewage farms to 4,000 acres, the development of 12 livestock seed farms to induce farmers to grow fodder and the establishment of a Fodder and Feed Research Station are recommended. 2,000 additional milk supply cooperatives and a rational milk pricing policy are proposed. Sheep and goat breeding will be upgraded to yield more meat, wool and milk and pork production will be increased 10 fold from the current 6,000 to 60,000 tonnes. The employment potential of the plan will be felt among I million families and 20,000 technicians.

The perspective plan for forestry is heavily industry oriented and calls for an investment of Rs. 28 crores. Its highlights are: the forest area in Tamil Nadu will be expanded from the present 16.84 per cent of State forest land to 18.64 per cent and for this purpose a programme of afforestation of waste lands and seashore sandy tracts,

extension of plantations along river and canal banks together with legislation prohibiting all encroachments or diversion for non-forestry as a major industrial input and to keep under rolling review the perspective plan and monitor its execution. The major emphasis of the plan is to expand and strengthen the industrial use of forestry products. The main forestry products to be expanded are:

		(in hectares)	
	IV Plan	*V Plan*	*VI Plan*
Timber ...	3,000	4,250	4,250
Wattle ...	4,000	11,000	11,000
Pulpwood ...	12,000	16,000	16,000

The plan also contributes to the employment generation objective of the perspective plan frame. Rubber, Tea and Coffee plantations developed in consultation with the Task Force on Agriculture will involve an investment of Rs. 373.87 lakhs, provide employment for 4,000 persons and is part of the State rehabilitation programme of repatriates from Ceylon. As part of the programme for tourist development three additional Wild Life Sanctuaries are proposed in Coimbatore District. Two factories are proposed, one for distilling sandal oil and the other for manufacture of feny from cashew apples. An expanded programme of forestry education and research to support the new forestry policy is also set forth. A programme of soil conservation in eight catchment areas of reservoirs at a cost of over two crores will make a direct contribution to agricultural productivity.

Fifth Plan proposals in civil aviation and tourism in the State supplement the Southern State's plan reported in the last issue of the Bulletin. The Meenambakkam airport is to be improved at a cost of Rs. 14 crores, including Rs. 6.70 crores for a new terminal complex. Tourist accommodation is to be expanded by the construction of tourist lodges and bungalows. Mahabalipuram is developing as a major international tourist attraction with its tourist lodges and 20 new cottages and the swimming pool. In the city, the Rs. 3.5 lakh Youth Hostel is nearing completion and will be part of this programme.

Power Crisis: The 25 per cent power cut referred to in the last issue of the Bulletin is part of a serious crisis in power that the State and Country face. For the Country, the generation capacity is 20 million KW against the target of 23 million KW. The CWPC hopes to achieve another 1.5 million KW by March 1973 and another 15 million KW by March 1974 do not seem very realistic. The targets of 40 million KW by the end of the Fifth Plan, 50 million KW by 1980-81, 180 million KW by 2000 correspond to the demand forecast, and unless action is now planned against these grim perspective demand forecasts, the Country will face stagnation in production and declining living standards. A question that arises is the futility and meaninglessness of all our planning including perspective planning over the last 2 decades, when we could not foresee our power demands in 1960, 1970, 1980 and adjust our generation programme to them. In Tamil Nadu, the power cut, the report of the State Planning Commission's task force on Power and the visit of the Union Planning Minister on the occasion of the Seminar on Perspective Planning have provided an occasion to analyse and make public the present

and future situation regarding the power supply and needs of the State which was summarised in the last issue. The State's power deficit is 1,750 million units, constituting 33 per cent of the requirements. Even more serious, the forecast for our power demand is :

Year	*Peak demand*	*Capacity required*	*Effective Capacity available*	*Deficit*
	MW	*MW*	*MW*	*MW*
1971-72	1,326 (actuals)			
1973-74	1,726	2,070	1,370	700
1978-79	3,020	3,620	1,940	1,680
1983-84	5,080	6,095	2,040	3,040
1990-91	9,140	10,970	2,040	8,930

Thus if the capacity plans are not revised, the current deficits of 700 MW will increase twelve times in two decades from now. There are four sets of problems that we face in the State with regard to power. The first cause is the shortfall in hydel power generation because of the failure of the South West monsoon. Our dependence on hydel generation can be seen from the fact that of the 1,571 MW installed capacity of the Tamil Nadu Eletricity grid, 1,224 is hydel (of which 693 MW are linked to irrigation discharges) and 347 MW is thermal. All our hydel plants are in the South West Monsoon zone and so we have to wait till the 1973 S. W. rains for our hydel capacity to come into effective use. The current storage capacity in our hydel reservoirs is enough to supply 8 million units a day and anything generated in excess is at the expense of the availabilities for next year. The failure of the S. W. Monsoon has also affected the catchment areas and hydel production in Kerala and hence it is not possible for us to buy or borrow power from that State. For the Country the stoppage in power production is due to the fact that 18 projects which should have been generating now will not be doing so till the Fifth Plan. Three of these projects—Kundah stage IV Hydro electric scheme (110 MW) as well as Ennore Thermal station extension (110 MW) and Kalpakkam Atomic Power Station (200 MW) are in this category. The second cause is the poor performance of our thermal plants. In the case of the Neyveli thermal power station, the inadequate quantity of mined lignite, the adverse ore overburden ratio and the October rains brought generation to 60 MW in October against installed capacity of 600 MW. In the case of the Ennore Power Station, the difficulties of the cooling system have reduced its generation to 110 MW which is 50 per cent of the installed capacity. For the Country as a whole, the maloperation of the generating sets, the unsuitability of the coal being used which result in damage to the boilers; and inadequate training of operating staff have led to a steep fall in Maharashtra, Gujarat and West Bengal of thermal power generation. The high ash content of the low grade and medium grade coal is endangering our thermal plants. The third set of problems relate to the heavy transmission losses. The system losses in the Tamil Nadu Electricity Board is at present 17 to 18 per cent. The fourth problem is the delay in setting up inter-State transmission lines as a means of rectifying the imbalances between power surplus and power deficit States. Of the 27 inter-State lines, only 3 have gone into operation. Only the South has been able to establish on a preliminary basis, a

regional load despatch centre to which reference was made in Vol. II No. 10 of the Bulletin as a means of maximising the benefits from the integrated operation of the systems in the four States. With Mysore and Kerala having no surplus for now, the Centre has not been able to relieve the serious shortage in Tamil Nadu. The result is that production in factories, farms are seriously hit in the State. It is particularly serious for textile industries in the State and the Country, at a time when the industrial stagnation seems to be lifting, with industrial growth touching 10.6 per cent in May, the highest in years. Textiles continued to provide the mainspring of this spurt due to the fall in prices and the rise in domestic and export demand. Now the 50 per cent power cut in Gujarat, the 25 per cent in ,Tamil Nadu and a lower cut in Maharashtra will lead to a reduction of 100 million metres of cloth and large quantities of yarn. Both engineering and textiles production are likely to be reduced by 25 per cent in the State. Some more precise estimates on textile production in Coimbatore are provided later. Caustic soda, non-ferrous metals, iron and steel, cement and fertilisers production will be down by 10 to 15 per cent in the State. Only the few firms like Manali and the sugar plants which have standby power plants are able to continue production unhampered. Now most units are finalising plans for lay off of their workers as the power shortage is a long term one and is likely to last into the Fifth Plan.

It is against this sombre background, the the State is taking short term and proposing to the Union Government long term measures for dealing with this urgent and vital power area. This short term action involves 5 measures; (a) Neyveli power production can be immediately increased to 400 MW by conversion of Neyveli boilers in oil firing, by using briquettes, by providing the machinery recommended by the Subramaniam Committee reported in Vol. II No. 7. (b) Ennore can be provided now with the cooling system so that it can double its generation. (c) Transmission losses can be reduced to 15 per cent by adding 350 MVAR of shunt capacitors, series capacitors, and synchronous condensors at a cost of Rs. 7 crores, (which the Union Government should provide) (d) advance action should be taken now on the 640 MW thermal, 480 MW hydro and 200 MW nuclear power plants under the Fifth Plan at a cost of Rs. 30 crores for advance payment of generating machinery, so that these 11 schemes—Ennore Extension, Pandian Punnapuzha, Kundha IV Stage, Kodamparai, Cholatipuzha, Servalar, Vellithorai, Parailiyar, Suriliyar, Tuticorin and Mettur Dam—can really generate power in the Fifth Plan, and (e) Kundah IV Stage should be acted on now, and the first two MW units at Kalpakkam should be completed, with work on the additional 400 MW started. In addition large and medium industrial units should be encouraged to set up their generating plants and for small scale industrial complexes, the government can set up similar plants. The long term measures planned and placed before the Union Government for approval include: (a) as the present mine cut at Neyveli utilises only 200 million tonnes out of 2,000 million tonnes of lignite available there, a 900 MW thermal plant with a second mine cut with a time of schedule of a first unit 200 MW by 1980–81, a second unit 200 MW by 1982-83 and a third unit 500 MW is proposed; (b) a 900 MW second nuclear plant at Tuticorin with the following timing: a first unit of 200 MW may by 1981-82, a second unit of 200 MW by 1983-84 and a third unit of 500 MW by 1986-87 is also proposed. These long term measures must be decided and initiated during the Fifth Plan if the power needs of the State and the Country over the long pull are to be met. In fact the short and long term projects for Neyveli and Kalpakkam should be part of an inter-State power development programme covering all the 4 Southern States. The Singareni project and the hydel

projects that can be developed in Mysore and Kerala should be part of this inter-State South zonal power generation programme financed by the Union Government not as part of the State Plans but as common inter-State projects. The Ministerial Committee set up at Union level with the Ministers of Finance, Steel, Industry and Power as members and Minister of Planning as Chairman should examine and propose action to meet the power famine in the Country on a short and long term basis. And the export committee that the Union Planning Minister is setting up to examine the power shortage faced by the State will submit an unusually quick report (the two or three weeks suggested is not realistic) in particular on Neyveli, the Tuticorin thermal plant, and other advance action proposals. The State Electricity Boards will be helped by the Rs. 6 crores UK aid in components and raw materials for three generating boilers. Here the timely and adequate use and care of this type of costly equipment should be assured by the Boards.

Prices and distribution: The price rise in consumer goods analysed in the last issue of the Bulletin continues (it was 8.9 per cent in September compared to 8.2 per cent in August) and has led to ameliorative action by the State. There is the overall decision for the States to take over wholesale trade in wheat and rice. Most States have expressed their inability to do so now. The State Civil Supplies Corporation in Tamil Nadu is procuring and stocking pulses, sugar, edible oil, etc. from outside the State and within the State and they will be distributed at low prices through cooperative stores, fair price shops and super markets. The first distribution outlets will be in first class municipalities but it is essential that these be extended rapidly to the rural areas where there is the real need for low priced consumer articles. From this point of view, the start made by the Tamil Nadu Textile Corporation in opening fair price shops in the rural areas in the Coimbatore district is a move in the right direction. On the basis of earmarked capacity of its looms in the mills it has taken over for the production of standard cloth and the results of its studies on the varieties to be marketed, the cost of the establishment, the prices to be charged etc., covering in fact the economics of the operation, standard cloth is being sold at prices within the means of the rural poor. Here the use of cooperative stores and super markets for similar distribution will come as the second stage-which is the right order of distribution.

Water and drought relief: The Rs. 6 crores relief programme for the drought affected areas of the State discussed in the last issue of the Bulletin has been the subject of consultation with the 3 member team from the Union Government towards the end of October. The crop failures in the districts of Dharmapuri, Salem, Coimbatore and Chingleput were studied on the spot by the team and its recommendations are now before the Union Government. From early October, the long dry spell in the State was broken with the onset of the pre and North East Monsoon. The effects are positive. The negative aspects on the flooding of the lignite mine at Neyveli, its lateness in relation to early sown kharif crops and some damage to the Kuruvai harvest in Thanjavur are incidental. On the other hand it has made for a rise in the reservoirs at Mettur and the Papanasam system, it has prepared the wells, rain fed tanks and other irrigation sources for effective storage from the further rains. This is important because about 66⅔ per cent of the State's paddy crop depends on well and tank irrigation. Another fall out has been that while the HYVs flowering and grain formation in Thanjavur have not been affected, ADT-27 has some lodging, making a very effective case for Karuna and Karikalan with their shorter bodies and richer yields. The net

result is that a good second season crop is now assured in the State. One part of the long term water resources of the State results from the Tamil Nadu-Kerala agreement on the use of Siruvani river water for providing drinking water to Coimbatore city and the use of the waters of Pandiyar-Punnapuzha for irrigation in the Coimbatore district. The inter-State discussions in early October on this lead to basic agreement on the first issue. The two States reaffirmed their 1969 decision for Kerala to supply 1,300 MC feet of water from Siruvani for Coimbatore drinking water, for which Tamil Nadu would meet the cost of the Siruvani dam in Kerala on the basis of designs and specifications drawn up by it and approved by Kerala. The only issue to be settled here is the Kerala plan to use the water also for Attapady Valley drinking purposes. The other inter-State water project is more complex. The 1965 agreement provided for Tamil Nadu using the waters of Pandiyar and Punnapuzha, which are tributaries of Chaliyar, for power generation and letting back 14.5 tmc feet of water into the Chaliyar for use by Kerala. Now Tamil Nadu wishes, in addition to the power generation part, to use the water for irrigation of the Coimbatore district. Kerala's claim that this part of the plan will increase the cost of the Kerala scheme needs to be examined with sympathy by this State in order to arrive at an early settlement on these two projects. An important forward move is the recommendation to the government by the State Water resources and use committee for the setting up of a Water Institute in the State which would act as the secretariat and consultancy agent to the State Water Council, which has been repeatedly set forth in Vol. II Nos. 3, 8, 9 and 10 of the Bulletin. The Institute will collect and analyse data with regard to water use, water management and water rates at a cost of Rs. 50 lakhs per annum and will help the State Council to formulate and execute an integrated water supply policy for the State.

Transportation: The government is in process of establishing detailed plans for the complete nationalisation of all bus routes and the take over of all buses by 1976 and is in process of drafting the necessary legislation. There is need for full and careful advance planning for purchase, operations, maintenance and training in this vast and complex net work of the poor man's transportation on the one hand, and the decisive role played by public transportation in cities and towns, given the low priority accorded to the production of quality automobiles in the Country. The purchasing of buses and their periodic replacement must be carefully planned for a 10 year period on a rolling basis. So too the procurement of spare parts and their stocking in well organised and maintained workshops all over the State must be ensured. Also a repair and maintenance service operating 24 hours of the day to keep the transports moving should be planned. A programme for training skilled bus drivers must be instituted in the ITIs and in special schools in the major cities of the State. Incidentally all drivers of heavy trucks should be trained in these institutions to increase the safety of all concerned in this mode of transport. Above all a systems operation should be used to ensure punctual and timely running of the service. The State is taking on a large responsibility and prior planning and preparation is needed to enable it to discharge its functions effectively. The Rs. 19 crores 5 year rural roads programme described in Vol. II No. 8 of the Bulletin has now, in its first phase, been launched to cover 219 of the 374 panchayat unions in the State. A separate rural roads circle with seven divisions under the Highways and Rural Works department has been set up to develop the rural communication system. The October seminar on rural roads has provided this programme with guidelines on priorities and solutions to different problems in road laying arising out of soil peculiarities

in local areas, and in using the latest techniques. There is a good chance that this State will effectively use the Union Government's assistance and the State's Rural Roads Development Fund and not be caught as other States with a growing time lag in approval and execution of the scheme. This also applies to the additional employment being generated under this programme. The Rs. 24 crores Madras outer harbour basin and the oil jetty refered to in Vol. II No. 10 of the Bulletin was completed in mid October. In addition to the Madras Refinery's use of the jetty which pumps 3,000 tonnes of oil per hour, the Indian oil Corporation will use the jetty for the Shipping Corporation's large tankers, Jawaharlal Nehru and Lal Bahadur Sastri, which each carry a load of 88,000 tonnes. The harbour construction has made available 100 acres of reclaimed land for setting up several port facilities, including the Rs. 16 crore mechanical ore berth (see Vol. II No. 9 of the Bulletin). This is an operation which though carried out with a one year time lag has been marked by a favourable cost-output ratio. With this modernised transportation facility, the export trade and the infrastructure for the industrial development of the State and Country have been noticeably strengthened.

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National

Fifth Plan: On the basis of discussion and consultation with the States, the Lok Sabha and its own studies for the Fifth Plan summarised in Vol. II Nos. 6, 7 and 9 of the Bulletin, the Approach Paper for the Fifth Plan has now been established by the Union Planning Commission and after submission and endorsement by the NDC will constitute the guidelines for preparation of States Plans and its own overall National Plan for the Fifth Five Year Plan. The highlights of the approach to the Fifth Plan are: (a) The basic objectives are self reliance and reduction of inequalities. The two are inter related. "No rates of growth that can be realistically envisaged can make a major impact on the problem of inequality as long as it remains as at present" and after repeating and defining the poverty sector in terms of the Tamil Nadu Draft Frame as constituting 2/5 to 1/2 of the population with a per capita consumption of Rs. 40 per month, it states that "growth and equality are both indispensable to a successful attack on mass poverty." (b) The growth rate proposed is 5.5 per cent overall, a decline in the rate of population growth from the current 2.5 to 1.7 per cent, agricultural growth of 4.5 per cent, industrial growth of 8 to 9 per cent, export growth at 7 per cent. (c) For this an outlay of Rs. 51,165 crores is proposed, at 1971-72 prices, with Rs. 29,745 crores in the public sector and Rs. 15,570 crores in the private sector, the outlay in industry being Rs. 8,000 crores in the public sector and Rs. 6,000 crores in the private sector. A high order of investment by the public sector in core industries like steel, fertilisers, heavy machinery, power, oil exploration and refining is proposed. In the three crucial development sectors of power, industry and mining and transport and communication, Rs. 19,000 crores (54 per cent of the total) are being allocated, together with programmes for the creation and full utilisation of capacity. The outlay for agriculture is Rs. 4,700 crores. The tentative sectoral allocation being considered for the Fifth Plan which will have to be further pruned and adjusted compared to that of the Fourth Plan can be seen in the following table :

Head of development		Rupees in Crores	
		Fourth Plan at current prices	Fifth Plan at 1970-71 prices
Agriculture and allied sectors	...	3,466	7,000
Industry and Mining	...	3,729	7,000
Trade and Storages	...	349	550
Transport and Communications	...	3,887	6,850
Power Development	...	2,448	5,700
Education	...	853	2,250
Scientific Research	...	140	300
Housing	...	251	925
Nutrition	...	—	500
Family Planning	...	315	560
Urban Development and Water Supply	...	529	1,100
Welfare of Backward Classes	...	193	520
Miscellaneous	...	149	300
Total	...	16,309	33,555

(d) Poverty is traced to underdevelopment and inequality. The programme for ensuring the minimum needs of the people has a total outlay of Rs, 3,300 crores included in the various sectors. This would be accompanied by effective restraints on consumption goods and services which have a large import content and increase in the production of goods of mass consumption together with price stability. Similarly intensive employment programmes are dovetailed into sectoral programmes. (e) Domestic resources mobilisation through larger market borrowings and small savings will call for an additional Rs. 6,600 crores compared to the Fifth Plan's Rs. 4,000 crores. There is here a significant assumption of contribution from public enterprises (Rs. 2,000 crores) which together with their internal reserves and depreciation funds will determine the gross investments in the public sector. Deficit financing is not to exceed the non-inflationary limit, which means a much lower level than that of the Fourth Plan. (f) The resource base for the Fifth Plan worked out at 1972-73 taxation level and 1971-72 price level starts with an external gap of Rs. 4,000 crores. This calls for increasing import/substitution, export promotions, a programme of debt servicing, taking into account the objective of reducing net foreign aid to zero by the end of the Fifth Plan. On import substitution, the trend has been the most satisfactory. For food grains the target of ending all concessional imports by 1971 has been achieved. The progress during 1968-69 to 1970-71 in reducing imports in raw cotton (from 5.6 to 3.3 per cent of total supplies) sugar mill machinery (from 3.8 to 0.6 per cent), textile machinery (from 31.4 to 12.7 per cent), machine tools (from 62.1 to 32.7 per cent),

aluminium (from 7.2 to 3.7 per cent), aluminium sulphate (from 68.5 to 9.5 per cent), bicycles, soda ash, bleaching powder, and man made fibres has been substantial, with steel and iron, fertilisers, newsprint, non-ferrous metals and oil continuing to constitute a heavy drain, which will have to be significantly reduced. A sizable increase in export earnings is assumed. The debt service payments in the Fifth Plan will be Rs. 2,360 crores. At one point the gross foreign aid was assumed by the Union Planning Commission's working group to be Rs. 3,000 crores during the Fifth Plan, leaving around Rs. 1,000 crores as net aid. The net gap in balance of payments was estimated at Rs. 2,000 crores but to conform to the decision to reach zero aid by 1979, additional efforts at import substitution and export promotion have been planned to reduce the gap to Rs. 400 crores.

The Approach Paper has certain continuities and discontinuities with frame work set forth five months ago and summarised in Vol. II No. 6. It is still a skeleton outline and has many gaps. The renewed emphasis on growth in the production sectors and its relation to the anti-poverty effort needs to be worked out in detail and some of the contradictions ironed out. Some of the facile assumptions and unreal hopes of the earlier frame have been corrected, but it is unwise simply to return to the traditional methodology. The sectoral allocations also need to be subject to further cost-benefit and cost effective analysis and be based in the case of social service sector on State and district plans. The education allocation may have to be reviewed in light of the needs of health, housing and nutrition. The targets need to be turned into programmes. Food output has to reach 155 million tonnes, which is a 50 per cent expansion in five years, cash crops have to double their rate of growth to meet the demands for cloth, sugar, edible oil by 1979. The consumer industries expansion call for an increased investment of Rs. 5,200 crores. To what extent is this to be met by the private sector, which requires a functioning capital market? And above all it is on the resource mobilisation proposals of the Approach Paper that further discussion and study should be concentrated. Government administrative non-plan expenditures, the low rate of saving of government and public undertakings which remain at what it was at the start of planning, (1.1 per cent of GNP instead of being 8-10 per cent)—all these need to be rather ruthlessly examined. And there is an air of unreality about the first computations of the balance of payment gap which is likely to be nearer Rs. 1,000 crores than Rs. 400 crores. The foreign aid assumptions are somewhat rigid. It is true that foreign aid as a percentage of our investment has been declining from 29 per cent in 1966-67 to 13 per cent in 1969-70, being an average of 8 per cent during the Fourth Plan. But to reduce it to zero by 1979 may not really be possible and is not in fact true. This computation does not take into account the expanding aid that we shall be receiving from the USSR and the Socialist Countries and our willingness to accept aid from friendly countries. It is also true that our debt servicing which is currently 27 per cent of our export earnings will be over 30 per cent during the Fifth Plan—which is 2½ times over the optimum limit suggested by Economics text books. The Fourth Plan will be achieving the target of halving net aid vis a vis the Third Plan, that is, Re. 1,850 crores compared to Rs. 4,000 crores in the Third Plan. Given all our constraints, the willingness of the aid-India Club to cooperate in our development and the sound international criteria that aid should reach zero when the economy has passed the point of self-sufficient growth, the timing of the principle of zero net aid might be examined. In any case the effects of aid reduction must be on the well to do sector of the economy, and not as in the case of USAID and CARE food reductions on the nutrition and midday meal school programmes of the poverty sector.

Prices and the economy: As noted earlier, the official wholesale price index which registered an increase of 8.2 per cent in August as indicated in the last issue of the Bulletin, climbed further to 8.9 per cent at 209, at 23 September, 1972, compared to that of that date last year. The Reserve Bank's report for 1971-72 notes that all commodity groups registered price increases in food articles going up by 11 per cent. The NCEAR's mid year review refers to the rise in prices between March and July of 8.5 per cent and points to food prices going up by 14 per cent, that of fish, eggs, and meat by 35 per cent and sugar by over 40 per cent. This rate of price inflation, which is unprecedented in this Country, is imposing serious hardship on the common man, the housewife and the poor man. In the Southern States, rice, pulses, vanaspati and refined oils, sugar, jaggery and coffee have risen by 10–30 per cent. Foot wear prices have increased by 50-100 per cent, vegetables price rise range from 20 to 100 per cent and as traders themselves remark, once the price of an article goes up, it never comes down. In the rest of the Country, the sharpest price increases have been in Western Uttar Pradesh, Bihar, Rajasthan, Gujarat and Maharashtra. The causes of this situation and the action to combat the inflation set out in the last two issues of the Bulletin are confirmed by the reports by the NCAER, the Reserve Bank and the Union Planning Commission. One cause is declining production. The NCAER points out that the government prediction of 15 million tonnes loss in kharif crop was as unrealistic and wrong as its forecast that there would be 15 million tonnes increase in rabi crops—which is likely to be around ½ of that. These estimates are also open to doubt. The decreased production — 2-3 million tonnes in food grains, a 6 per cent growth in industry instead of the targeted 8-10 per cent, and a 5 per cent increase in exports — is one cause of price inflation. Even this forecast of NCAER is a little on the optimistic side as the major industrial sectors registered a mere 3 per cent growth. A second cause that all reports agree upon is "the inexorable growth in money supplies". On the one hand bank credit to the corporate sector has steadily declined due to the industrial slackness referred to; on the other hand the growth in public sector plan and non-plan outlays and increased money supplies with the public are to be noted. The Bank report points out while total receipts of the Central and State governments increased by 15 per cent in 1971-72 compared to 4.1 per cent in 1970-71, developmental outlays rose by 17.4 per cent against 14.3 per cent the previous year and even more non-developmental outlays shot up by 19.8 per cent as against 12.1 per cent in 1970-71. This increase in government expenditure was thus reflected in the increase in the aggregate monetary demand as seen in (a) the expansion of money supplies with the public by 13.6 per cent and (b) a steeper rise in aggregate monetary resources by 16.2 per cent. It need only be noted that the GNP increases were only 4 and 4.7 in these years. A third factor on which all reports agree is the havoc played by deficit financing on the economy which is back of the money supply factor. The Bank reports that the combined overall budgetary deficit of Union and State governments increased during 1971-72 from the originally anticipated level of Rs. 387 crores to Rs. 631 crores, despite the additional resource mobilisation of Rs. 250 crores. Both the NCAER and the Union Planning Commission analyses give this factor pride of plea. This trend is continuing this year, despite clear warnings by all, including this Bulletin, the deficits recorded for April-August of this year is Rs. 208 crores compared to Rs. 165 crores for the same five months of last year. Other inflationary forces in the economy are the decline in the proportion of public savings, including dissavings in government undertakings, increase in the proportion of foreign resources utilised for financing investment (at a time when our Fifth Plan approach paper calls

for zero net aid by 1979), the expansionary influence from parity changes on our foreign exchange assets, our growing trade deficit which increased from Rs. 99 crores in 1970-71 to Rs. 286 crores in 1971-72, though as noted in the last two issues of the Bulletin, our exports are now picking up. All these factors which are making for our inflationary crisis and their effects on the economy and the poor majority in the Country are now well established. The remedial actions outlined in the last two issues of the Bulletin are also reiterated by the three reports—NCAER, the Bank and the Union Planning Commission—namely, immediate increase in production including short term action on the power deficit, whose disastrous effect on production will be seen in the next few months, rapid expansion of the output of consumer goods, pulses, oils, sugar, fish, milk and cloth which in some cases involve imports, using our comfortable foreign exchange reserves, a cut back on non-development on development expenditures and a halt to further deficit financing and increase in money supplies and setting in motion a distribution net work of fair price shops and rationing of some essential goods. In one area, increasing of production and some imports of essential goods, action is under way; short term power generation schemes are now being set up seriously; and the States have begun developing the distribution net work as seen earlier, including superseding the wholsalers in some sectors. Now the call is once more repeated for integrated, early and effective action on all fronts to stop further price rises and help in retracing our way at least by 4 or 5 percentage points.

National Production Front: Bokaro: With the commissioning of the first blast furnace of the first stage of the Bokaro Steel mill in early October, the prospects for steel production are improving. This fourth public sector steel plan will produce 1.7 million steel ingots by next year in the first stage, expanding to 2.5 million tonnes by 1974 in the second stage, on to 4 million tonnes in the third stage and reaching its full expansion in the fourth stage at 5.5 million tonnes. Bokaro will cover fully the estimated gap between supply and demand for flat products which NCAER had computed at 1 million tonnes by 1975 and 2.54 million tonnes by 1980. At 90 per cent utilisation of the 1.7 million tonnes capacity which it will reach by 1975-76, it will produce 1.2 million tonnes flats and the same capacity use of the third stage of 4 million tonnes; will produce 2.9 million tonnes by 1980-81. If these forecasts are fulfilled, the most important being capacity use, which has not even now been attained by the other 3 public sector units, (vide the shortfalls in attaining the year's targets in the first six months which instead of being 50 per cent is 24.25 per cent for IISCO, 35 per cent for Durgapur, 42 per cent in TISCO, 43.7 per cent in Rourkela and 44 per cent for Bhilai), then a number of important fallout effects will obtain for the Country. Bokaro's contribution to our export will be the purchase of 25,000 tonnes of pig iron by the Soviet Union. In meeting in full the Country's demand for flats, a saving of Rs. 150 crores in foreign exchange will be effected and the problem of self reliance in this sector noted earlier met. The Union Government's excise revenues will be increased by Rs. 25 crores in the first stage and Rs. 60 crores in the second and the State's revenues from sales tax increased by Rs. 3 crores and 7.5 crores. Its employment generation will be 13,000 and 20,000 workers along with a host of subsidiaries and ancillaries. Bokaro also has some important lessons for the planning and execution of future large public sector units. In this regard the pay off in term of minimum consumption of material usage, power and water in sectors like this, of using the latest technology, sophisticated techniques such as automation, mechanisation and centralised production control and management to ensure optimum use and distribu-

tion of power, water, oxygen, inventories etc. is demonstrated. It should be noted that this involves also saving on labour. A second important lesson is the need to correlate planning and execution objectives and schedules. The delay factor in Bokaro has been noted in Vol. II No. 9 of the Bulletin, though the time lag has been less than forecast then. But the delay was built into the conception of the project and was not due to execution lags. The two basic reasons for the delay were that in building the plant for the first stage, the bulk of the construction for the second 4 million tonnes stage has also been completed (84 per cent of earth work, 74 per cent of RCC and concrete, 84 per cent of the underground cables, 73 per cent of structural steel work and 64 per cent of the equipment erection) and the impossibility of Indianising the equipment for the plant on the one hand and adhering to the schedule drawn up in the project plan in the situation of our large public sector undertakings on the other. We have every reason to be proud of the Bokaro plant, which represents 65 per cent of the total Fourth Plan steel equipment investment (Rs. 680 crores out of a total provision of Rs. 1,053 crores), and is a "Swadeshi Plant", as the Steel Minister termed it. It is a milestone in realising our larger objective of self reliance. Besides the larger participation of Indian firms and organisations in design and engineering (90 per cent of the steel structure, 65 per cent of the mechanical equipment, 80 per cent of electrical equipment and 37 per cent of refractories have been procured indigenously) has given the firms invaluable technical experience. But the price of this had to be paid. Being the first time our firms in the public and private sector—HEC, MMAC, BHEL and the Garden Reach Workshop—were handling such large orders, the project planning should have allowed for delivery delays. The largest equipment suppliers, HEC at Ranchi with Rs. 104 crores for 72,000 tonnes of mechanical equipment and 26,000 tonnes of structurals and MMAC at Durgapur who were responsible for conveyor belts and refractories were also the heaviest time defaulters. Bokaro has been more a programme for developing our indigenous manufacturing capacity for producing steel equipment, rather than ensuring the building of the 1.7 million or 2.5 million tonnes of ingot steel on time. This lesson that the two objectives cannot be combined, no more than one can eat his cake and keep it, has been learnt rather late for Bokaro when the plans were revised and 80,000 tonnes of steel, 81,200 tonnes of refractories and 16,000 tonnes of structurals were imported with the Soviet credits of Rs. 167 crores. But that lesson has now been applied in planning Salem Steel (see Vol. II Nos. 4, 7 and 8 of the Bulletin) and other large units in the Country. There are also lessons concerning substandard materials and equipment and escalationg costs of equipment and wages involved in the delay and the four times revised time total which pushed up the first stage cost from Rs. 650 to Rs. 760 crores. Bokaro is a valuable plant and in addition has many lessons for public sector planning and execution which if learnt and acted upon would make this also an invaluable experience. It calls for a programme of maintenance and training of its sophisticated equipment which dare not be neglected. The Rs. 47 crores modernisation and expansion of capacity programme of IISCO and the Rs. 400-500 crores doubling of capacity programme of TISCO should profit from the Bokaro experience.

Stimulating Production: In early October, 11 more industries, from hosiery needles, road rollers and polystrene to diesel locomotives, industrial alcohol and synthetic detergents have been added to the 54 critical industries (see Vol. II No 2 of the Bulletin), whereby the licensing policy is being relazed to secure fuller utilisation of existing capacity and expanding capacity to increase production in these lines to meet

the demands of the economy. In addition, to meet both domestic demand and to counter the decline in exports, programmes are being initiated to increase iron ore production. The original export target of 50 million tonnes by the end of the Fifth Plan is out and even the scaled down target of 25 million tonnes is not being attained with last year's export of 20.8 million tonnes. The production target also has been scaled down from 51.4 million tonnes to 42 million tonnes because of NMDC's poor performance. To counter this dismal picture, feasibility studies of 4 mines in Orissa and Mysore, an integrated development of ore deposits in these States plus Madhya Pradesh and programmes to step up production in the existing mines have been taken in hand. The needs of our steel industry as well as the export market demand a sizable stepping up of production before the start of the Fifth Plan. Two other developments respond to the need to expand our production effort to counter inflation. After a survey of 52 firms, guidelines have been established for public sector firms to develop preventive maintenance organs instead of the current emergency breakdown repair system which simply prevents the work interruption. Even there such interruptions that should not be more than 10-15 per cent, have reached 30 per cent in chemical and process industries. A proper maintenance system and training of the staff in the system can lead to some 20 per cent expansion in output. The other speeding devise is the setting up of the Public Investment Board which will scrutinise and approve all proposals for investment of Rs. 1 crore and above. This will cut down the enormous time now wasted in investment scrutiny by as many as 12 different points and will provide a high level decision making forum which should not get lost in minutiae, as the present procedure tends to, and should concentrate on the broad contours of the investment proposals in order to decide whether the next stage—preparation of a feasiblity report—should be authorised. The Board should look at new projects and expansion projects under the qualifying criteria of Rs. 1 crore and above and cover both public sector and joint sector investments in which government participation is Rs. 1 crore and above. On approval of the proposals, the feasibility report should respond to (a) the Plan priorities, (b) the established socio-economic objectives, (c) the sector—public, joint or private—it should be in, (d) the cost-benefit calculus and (e) the technologies, construction and availability of plan resources. The Board should be an instrument for speedy and rational action on moving the production machine forward.

Other expansions : Other expansion schemes cover sugar, shipping, textiles, drugs, industrial alcohol and cement. The Industrial Finance Corporation's annual report shows, growing financial assistance being extended to cooperative sugar and textile units, new projects in fertiliser, sugar, iron and steel and chemicals to the tune of Rs. 39.16 crores. 13 new entrepreneurs and 17 projects in backward districts have received special finance. Now its resources—both rupee and foreign exchange—need to be expanded. The modernisation of the textiles sector also should receive urgent attention. The industry's claim that the IFC criteria of providing long term finance to firms which are exporting 15 per cent and over their output is too restrictive cannot be taken seriously. This requirement must be met and the IFC resources used fully. The problem is two fold. First the sector is not generating funds for its modernisation. This is serious and its claim that the average plough back during the last five years 1965-66 to 1969-70 was negative to the tune of Rs. 4 crores and that in 1967-68 and 1968-69 was negative to the extent of Rs. 5 crores and 12 crores involving an alarming rate of capital consumption should be subjected to an expert study. If this is true then of course the industry is not

credit worthy either for our banking finance or for external sources. The other problem is that the Foreign Trade Ministry's computation of the cost of modernisation at Rs. 523 crores or Rs. 75 crores a year which is a staggering total is revised by the industry to Rs. 630 crores or Rs. 90 crores per annum including the cost of packing, forwarding and erection of machinery. This is the kind of sickness that is being built into parts of the private sector and justifies State intervention and regulation. Now the problem of modernisation must be faced and solved. On the other hand, an invention patented in October of a multi filament yarn singeing machine reduces initial investment and maintenance costs in yarn processing and adds more value to our yarn exports. An imported yarn singeing machine costs Rs. 2.50 lakhs, while the machine invented costs around Rs. 12,000, reduces fuel costs by 70 per cent, labour costs by 50 per cent (which is a problem in our labour surplus economy), involves Rs. 9,000 value added per day and by producing grey yarn will increase the return on every kilo of yarn exported by Rs. 4.50. There is a case now for banning the export of grey yarns, which are processed and re-exported by its importers and for offering the usual export incentive to build up our exports of this yarn to countries like UK, France, Soviet Union, Ceylon, etc. As noted under the State section, from November the entire production of controlled cloth is being distributed by the mills on behalf of the Textile Commissioner to their own retail shops, fair price shops and cooperatives. The price is mill prices plus 12½ per cent instead of plus 20 per cent in the past, involving a price cut of around 8.5 per cent. Retail purchase is limited to one pair of dhoties or sarees on 10 metres of cloth, to prevent diversion to the black market. This has provided noticeable relief to the people in the rural poverty sector as a network of mobile shops are being put into operation.

Sugar, Railways, Drugs and Shipping: Advance action now is being taken in regard to the Fifth Plan estimates to increase sugarcane production from around 13 crore tonnes to 17 crore tonnes and sugar production from the current 35-40 lakh tonnes to 60 lakh tonnes by development programmes around the 118 factories in the sub-tropical region and 102 in the tropical region. The Fifth Plan scheme will bring 3,70,000 hectares under this intensive sugarcane development programme at a cost of Rs. 27 crores together with a Rs. 12 crore scheme to increase beet sugar to 1,88,000 tonnes per annum. In recent meetings with the Union Planning Minister, the State Planning Commission has been requested to develop a project now for expanding the capacity of sugar mills and instal large capacity plants (4,000 tonnes each) on the basis of a rapid extension of cane cultivation. This advanced action expansion programme will also help meet the acute shortage of industrial alcohol whose demand is 400 million litres while the internal production is only 270 million litres. The rubber and polythene firms depend on this input and its import can be reduced as molasses increase with the drive to increase can production. If this year sugar production increases to 40 lakh tonnes, molasses should amount to 18 lakh tonnes which can, after allowing for other uses such as consumption and illicit distribution, increase the supply of industrial alcohol to 330 million litres. The Tamil Nadu situation is comfortable with the full functioning of the 2 million gallon Sakthi Sugars distillery, the Aruna, EID-Parry and Tiruchi distilleries. There is need for establishing further distilleries in the Country to meet the growing demand of our alcohol based industries and the new distilleries should be in areas where there are molasses. The demand for cement, as for coal, is increasing sharply and the Union Government calls for an increase in the capacity of existing units and starting of new units. Meanwhile even existing cement supplies in Tamil Nadu and Mysore are lying in the factories

because of the shortage of railway wagons. Associated Cement reports that against a capacity of 66.6 lakh tonnes, it restricted production to 51.47 lakh tonnes in the year ending July 31, 1972 compared to the output of 53.46 lakh tonnes for the previous year, due to wagon shortage, a cut of 11.7 per cent and 9.9 per cent in the two years production. Even this output would not have been attained if around 16 lakh tonnes — 30 per cent of production had not been transported by road. The Ministry of Steel and Mines also states that inadequate railway transport is crippling the coal industry. At a time when there is a virtual coal famine, huge stocks of coke/coal have accumulated at pit heads, it reports. It attributes the decline in coal production to less than 72 million tonnes, when its annual raisings have passed 80 million tonnes to the deteriorating wagon supply situation. The same situation is reported by the Ministry with regard to steel where it states that huge unsold stocks of steel sheets are rusting in government godowns, while the engineering industry is crying aloud for steel. On the other hand, the railway authorities claim that wagon shortage is an alibi for the real causes for price rises and cement, steel and coal shortages. They point to the fact that prices of cement, coal and other consumer items have not responded to the accelerated movement of wagons from all railways to Calcutta. Inflation, of course, is not due solely to wagon shortage and there are traders who are interested in maintaining shortages in order to boost prices. A case in point is the example cited by the railway authorities that despite enhanced demurrage charges, the trade parties prefer to pay these charges and not unload the wagons in the Calcutta area. The West Bengal government is taking action on these anti-social forces. But the evidence is clear that there is a shortage of wagons and inefficiency in their turn around and use — (see also Vol. II Nos. 5. 8 and 9). Under these conditions the production of wagons must be increased and certainly not allowed to decline as it did in August by 210. The railways must review their programme of dieselisation in view of the drain on the Country's foreign exchange resources in importing diesel and the large stocks of coal available. For the same reason there are limits to the use of road, river and sea transport. Railway administration must urgently improve the use and turn around of wagons. In any case the inter-ministry controversy is pointless and in this case, the Railway Board must act. The Fifth Plan programmes for doubling the production of drugs and trebling the output of basic drugs needed by the common man calls for decisions now as to what will be the role of the public sector, the private sector, particularly those with foreign participation and the small scale sector. Further action must now be taken to develop R & D in the large firms — an area which is almost absent. On the basis of the good record of the Shipping Corporation of India whose net profits for last year exceed Rs. 8 crores, it is necessary to increase the Country's ship building capacity which including Cochin is only 2,00,000 tonnes per annum, against a trebling of the capacity in relation to the 3 million tonnes demand that we will face in the Fifth Plan. We are late comers in this vital field and we have concentrated too much on ship repairs instead of building. Now all bottlenecks to increasing our capacity such as in materials procurement should be removed and again advanced action must be taken now to close the gap by the Sixth Plan.

Agriculture : On the agricultural front, it is still not possible to assess the exact effects of the drought and the erratic and uneven nature of the rainfall on the 1972-73 crop. The kharif crop, particularly of rice, bajra and maize is definitely lower particularly in Gujarat, Maharashtra, Mysore, Andhra Pradesh and Rajasthan. The government estimates are that the estimated kharif loss of 15 million tonnes will be reduced by

4 million tonnes due to the emergency programmes referred to in Vol. II No. 10 of the Bulletin. A good guess is that the kharif loss will be 10–11 million tonnes. What is disturbing is that crash rabi sowing is also facing serious difficulties from inadequate sub-soil moisture and low levels of irrigation tanks. Fertiliser availability is also another problem as pointed out in the last two issues of the Bulletin. One means of meeting the shortage would be improved use and better distribution of existing stocks. There is over use of nitrogen and underuse of phosphates and potash which is in the ratio of 6 : 2 : 1 for all India, ranging from 29 : 3 : 1 in Haryana to 13 : 5 : 1 in Madya Pradesh against the optimum of 4 : 2 : 1 in the Fourth Plan. This not only creates supply bottlenecks but decreases the nutrients fed to the crop. Again the decline in fertiliser consumption which shows a 6.2 per cent growth against the Fourth Plan target of 14.5 per cent is in part due to the drought condition and in part due to lack of credit facilities. The cash crops are also in a bad way. The cotton crop which is doing well in Punjab and Tamil Nadu has been affected in Gujarat and Maharashtra, placing the total at 62 lakh bales, against the 65 lakh bales estimate in the last issue. The groundnut crop has been affected in Gujarat, Andhra Pradesh and Tamil Nadu, and the crop estimates are around half of the normal —which if true would lead to a disastrous increase in price. But crop estimates are not very reliable. Against the predicted shortfall in jute production by over 2 million bales in the last four issues of the Bulletin, reports from West Bengal indicate plentiful availability of jute in the rural areas. In fact in those marketing centres, the price has declined to Rs. 30 per maund against the stationary minimum price of Rs. 43 per maund and there is a call for the Jute Corporation to intervene to make large scale purchases to prevent distress sales. It is the same case with rubber where despite the buffer stock of 15,000 tonnes, prices are falling below the statutory minimum. In this case, the power cut may be contributing to slackened industrial demand by the tyre and tube industry. In fact the power reduction will call for use of diesel, which is expensive and a drain on our Foreign exchange and is a further production decreasing factor. Under these conditions the Union Government's plan to distribute fertilisers in 35 districts and promote its balanced use at a cost of Rs. 2.9 crores this year might help the rabi crop prospects. The other bottleneck of credit availability to expand production will be helped if the cooperative policies and procedures are simplified and modified to get the credit needed by the small farmer to him on time. Their policies and procedures for helping farmers, dairymen, fishermen to increase production and productivity decided at the recent meeting of Registrars of Co-operatives should be put into effect now to help us in the agricultural crisis. The Fifth Plan credit targets are good and impressive, doubling short term credit to Rs. 1,200 crores and long term credit to Rs. 1,100 crores, but what is needed is to get credit now to the farmer. The recently issued Reserve Bank manual, "Production oriented system of lending for agriculture" is excellent reading. Its directive for the rational assessing of the agriculturist credit need, the simplified pro forma for assessing the repaying capacity and the rules for extending co-operative credit to share-croppers and oral lessees should be put into effect, bearing in mind the literacy status of the majority of the farmers. This may also be the occasion to help the small farmer to use the new technology in an integrated manner and use of credit tool to promote such multiple use of the technology of improved seeds, water use, fertilisers and pesticides. The recently published data on the contribution of agricultural incomes shows that the eight States—Gujarat, Haryana, Punjab, Kashmir, Kerala, Mysore, Orissa and Rajasthan—where they grew by more than 200 per cent during the sixties, while the all India average agricultural income growth was 142.6 per cent compared to 137.5 per cent national income growth, were also the States

with the smallest rural population. States with large rural population, comprising agricultural labourers, share-croppers, and small and marginal farmers show the smallest increases of 96-110 per cent in their agricultural incomes. The statistics presented at the Ahmedabad October Seminar on rural development however indicates that agricultural prosperity and rising levels of living of farm labour do not go together. The paper on the subject points out that 70 per cent of the rural population or about 300 million agriculturalists are living below acceptable levels of living now. Our Green Revolution has a very thin social base. The percentage of the farm poor doubled in the sixties in Punjab and Haryana described as the throbbing heartland of the green revolution, and in Assam and West Bengal it quadrupled. The truth behind these facts emphasise that both in the present emergency and in the long run, production increases and rural poverty must be attacked through multiple means,—the effective multiple spread and use of the new technology, land ceilings plus the needed inputs, price support policies, rural works and employment oriented schemes and crop in insurance programmes. Insurance is needed through further intensified research in developing a variety in each crop, as well as disease resistant strains in our wheat, rice, maize, jawar and bajra crops. With our slender production margin, we cannot afford the spread of pests and viruses through uniform strains. This is as much our research task now as expanding the yield.

Finance and credit : On the fiscal side unlike the recent trends reviewed in the prices and economy section, there are some hopeful current portents. One is that the Union Government's deficit is likely to stay within the budget amount of Rs. 242 crores (see Vol. II No. 4 of the Bulletin). This is creditable because Rs. 400 crores more has had to be allocated under various unforeseen heads, supplementary demands (Rs. 48 crores), emergency rabi programme (Rs. 150 crores), drought and flood relief (likely to be an extra Rs. 75 crores), interim dearness allowance (Rs. 21 crores) subsidy for additional procurement prices for rice and coarse grains (Rs. 20 crores). On the other hand the Central resources are also likely to exceed the budget estimate by the same amount due to increased market borrowings for which there is more scope, increased income from excise and customs with the increases in production and imports, rising small savings and alas ! the usual shortfall on plan expenditures. The Union Government's market borrowing has resulted in Rs. 108 crores above the estimated net of 215 crores asked for and together with that of the States and the State Electricity Board, total net borrowings have been Rs. 538 crores so far. There have been or will be IDBI and IFC bond issues But due to growing bank resources, decrease in advances, sale of buffer stocks, staggering of investment portfolios, the Union Government can go into the market for a further Rs. 150 crores borrowing. With the start of industrial recovery, itself sparked by increased imports, the revenue from income, customs and excise taxes could expand by Rs. 80 crores to 100 crores. The small savings target has already been revised up by Rs. 45 crores. The shortfall in plan expenditures for this year is likely to be above that of last year (Rs. 100 crores), as an additional Rs. 370 crores have been pumped in this year. All in all the deficit may be even less than the target estimate. Another hopeful anti-inflation trend in the Rs. 100 crores decline in money supplies at the end of September, both through a reduction of notes circulation and drawing in of funds in the hands of traders and the public through foodgrain, sugar and cloth sales just referred to. On the other hand, some relaxation of credit restrictions on the industrial and agricultural sectors is being planned. There is an increasing trend for financing the entrepreneur scheme and projects in the backward areas through joint

financing by several institutions—IFC, IDBI, commercial banks—for large industrial projects. From October the Credit Guarantee Corporation has liberalised its small loans guarantee programme for transport operators and farmers. Upto Rs. 1 lakh, transport operators can now obtain credit for repair and renovation and spare parts for their vehicles, in addition to their loans for purchase of the vehicle. So too upto Rs. 37,000, joint families of farmers and two projects instead of one became eligible. The Agricultural Refinance Corporation has extended in time and liberalised its refinancing facilities — particularly for SFDAs and MFALs, through commercial banks — to push forward the urgently needed land development and use programmes such as soil conservation, cantour bunding, anti-erosion, etc.

Exports : Subject to the cautions refered to in the last issue of the Bulletin, cautions more strongly expressed by the October 21 issue of the Economic and Political Weekly, the Government statistics on our exports and foreign trade are encouraging. Exports during the period April to August amounted to Rs. 756 crores, which is an 18 per cent increase over the corresponding period last year, against the Fourth Plan target increase of 7 per cent. Against last year's deficit of Rs. 125 crores for this period, this year's 5 months register a surplus of Rs. 56 crores, as imports have declined from Rs. 765 crores for last year's first five months to Rs. 700 crores this year. Against the export target of Rs. 1,760 crores for this year, in five months we have recorded Rs. 765 crores and at this rate this year's export growth will be 9.5 per cent and for the first time in four years, we would have a trade surplus. The export season really begins in October and if the economy grows and our export drive succeeds, we should have the foreign exchange resources that our development needs. To some extent the realignment of European currencies have been having the usual time lag beneficial effect on our exports. It has helped to boost our exports to the EEC countries, Japan and the UK because our exports have become cheaper. Between January to March 1972 our exports increased to $ 250 millions, compared to the pre-realignment period of the first three months of 1971 of $ 216 millions. On the other hand though India's exports to US became a little more expensive, given the inelasticity of the US demand for our exports, there has been no decline in our exports to the US. On the whole the currency realignment has strengthened the Rupee. This favourable trend will continue in so far our economy can generate the additional export supplies to meet the larger export orders. In this context, the Asia Trade Fair 72 that started in early December in Delhi should be an export booster. The 4 month delay in the execution of the Yugoslav order (referred to in the last issue of the Bulletin) for rail wagons by 3 of the 5 supplying firms is a minus in this regard. The India-Kuwait agreement for enlarging our imports of urea and sulphur and exporting a wide range of industrial and engineering goods, the German order for Rs. 36 lakhs bicycles and bicycle parts, our booming pepper exports with 18,000 tonnes out of the total exports surplus of 22,000 tonnes going to the Rupee trade area for the coming season, the Rs. 8 crores contract to export 1.14 million tonnes of iron ore to South Korea, and the growing tobacco exports to the EEC countries via UK, are some of the developments recorded in October. In regard to textile exports and the government intention to impose a 15 per cent statutory export obligation on the mills referred to in Vol. II No. 9 of the Bulletin, the government has withdrawn its proposals in favour of the Indian Cotton Mills Federation Voluntary Scheme to export Rs. 145 crores of textiles, with compensatory assistance to marginal units for their losses in exports. Already Rs. 82 crores have been exported and the scheme includes self policing penalties

to those lagging in export performance and incentives to export promotion. The 670 textile mills and 377 spinning mills (Tamil Nadu has 50 per cent of the latter) joining this scheme might set a useful pattern of voluntary action for other industrial sectors to follow. STC's export performance reviewed in Vol. II No. 8 of the Bulletin is also improving particularly in the matter of new commodities. Its export orders for Rs. 92 crores (not Rs. 107 crores as reported earlier) for the year include such new items as 1 lakh footballs to the US, Rs. 75 lakh vacuum flasks to the Soviet Union, Rs. 2 crores castor oil to the UK. Its exports are now running at the rate of 18 per cent for this year.

Aid India's gross aid from the consortium countries for this year will be $ 800 million against the target of $ 1,250 millions ($ 700 millions nonproject and $ 550 millions project aid)—see Vol. II No. 6 on which the figures should be revised. For 1971—J2 against the consortium target of $ 1,150 millions, aid agreements signed equalled $ 768 millions. Of the $ 800 millions aid expected this year, $ 650 millions will be used to service debt obligations, leaving a net aid of $150 millions. With the US not involved in any of the aid agreements, IDA has emerged as the largest contributor with $400 millions. There has been some delays also in the processing of bilateral aid agreements with the UK, Germany and Japan, but by December this would be completed in order that the debt repayments may be made at that time. Aid in the pipeline is dwindling, particularly non-project aid at $265 millions, while project aid at $1,500 millions faces problems of low utilisation due to reasons analysed in the last issue of the Bulletin. The rescheduling of debt repayments which now total Rs. 6,602 crores has made no progress as yet, constituting 27.6 per cent of our current export earnings. Debt repayments for this year will reach the high point of Rs. 504 crores. Striking a balance sheet, as stated earlier, it looks as if the Fourth Plan target of halting the net aid reserved will be reached and surpassed. In this Plan period the foreign exchange needs were computed as Rs. 16,150 crores plus Rs. 2,280 crores for debt service repayments. The export earnings estimated at 7 per cent compound growth was to bring in Rs. 8,300 crores and the rest was expected in the form of aid including Rs. 1,850 crores in debt servicing. After April 1973 it will be possible to see exactly what has happened against these estimates and those of the mid term appraisal of the Plan summarised in Vol. II No. 3 of the Bulletin. The foreign exchange reserves of the Country—despite the fall in aid, and liberal imports of steel, ferrous metals, now extended to small industries and some consumer articles like pulses and oils—have remained stable at Rs. 856 crores, due in part to the SDRs issues. The Soviet Union cooperation is being extended and placed on a long term footing in relation to the Fifth Plan. Working parties of the 2 countries are finalising Soviet cooperation during the Fifth Plan to core sector projects such as steel, fertilisers, non-ferrous metals, petroleum, etc.

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International

Bangla Desh : The Indo-Bangla Desh Trade review in October, referred to in the last issue of the Bulletin has arrived at certain decisions to deal with the immediate problems affecting Bangla Desh and has set the stage for a continuing discussion and review of the other problems. The first result has been the decision to suspend border trade between the countries, which instead being to the mutual advantage of the people

living on the border, has been misused for large scale smuggling with loss of revenue to the Bangle Desh Government and in its view a cause for consumer goods scarcities and price rises. As an irritant, this ban is a necessary step which can be ended as the Country moves into a normal situation. A second decision has been to review the March trade agreement calling for mutual exports and imports for the year valued at Rs 25 crores. After review, it was agreed that the trade between the two countries will balance at Rs. 20 crores rather than at Rs 25 crores for this year. This set back in trade relations arises from several factors. The most immediate factors relate to the major commodities involved. Bangla Desh's exports of jute to India which was to be 7.5 crores had till October amounted only to Rs. 58 lakhs due to differences over the price. As noted earlier the jute price is falling in West Bengal, but Bangla Desh which has to pay its producers Rs. 50 per maund demands a higher price. Towards the end of October agreement was reached on the terms and conditions of jute exports for the target of Rs. 7.5 crores. The other Bangla Desh export is Rs. 9 crores of fish, which because of internal needs, and the distruction during the war of its refrigeration facilities has not been the subject of trade. It is not likely that more than Rs. 6 crores fish will be exported to India. Both jute and fish exports to India face another larger problem. These are also Bangla Desh's major foreign exchange earners. To date they have brought in Rs. 100 crores and by the end of the fiscal year they will earn Rs. 300 crores, and this India should both welcome and facilitate. On the Indian side the exports of coal, cement, cloth and tobacco are moving forward. Coal and cement will be delivered in full, though their value will be lower by Rs. 1 crore each because of the lower export price. In the case of tobacco, the exports will be Rs. 7 crores instead of Rs. 10 crores, though the tobacco trade expects to reach the target. Both cotton and textiles exports will pass the target, though the quality and price of our textiles are causing discontent in Bangla Desh. This the government there must remedy in terms of its sales orders and internal market arrangements. Behind the trade irritants between the two countries are grim facts. The UN survey on damage to Bangla Desh economy is almost identical with that of its government. The UN estimate is Rs. 930 crores and the Bangla Desh estimate is Rs. 1,000 crores. This is a simple indication of its damage road, railway and river transportation, its lack of technicians and civil servants and the time needed for its nationalised trade and banking system to work. The recent repair and opening of the Hardinge Bridge by the Indian team and the clearing of the Chittagong harbour by the Soviet team are resulting in a freer and faster flow of trade. The two countries have made further progress on flood control in the Sylhet-Cachar basin at the second meeting of the Joint River Commission, and in agreements on inland water transport which will link West Bengal with Assam and Tripura. An exchange programme in the educational, scientific and cultural fields has also been concluded and is being given effect to. The assistance to the Bangla Desh Education Commission planning a wide ranging educational reform and to the Tagore Museum that it is setting up would be of long range importance.

Asian Perspective in Agriculture, Telecommunications and Investment: The October FAO Asian conference in New Delhi established social justice, self reliance and growth as the objectives of agricultural development for Asia. The priority programmes recommended are development of small farmers and dry farming programmes, promotion of livestock development and studies of water management at the farm level. Integrated food and nutrition policies, harmonisation of inter-Asian agricultural trade, development of marine fisheries and coastal aqua culture and programmes of product diversification

and export promotion have been especially emphasised for the region. The Director General of FAO addressing the conference called for a better deal for the products of Asian and developing countries in the markets of the developed world and warned against the social discontent which the Green Revolution is mainly benefiting the larger farmers may result in. The conference conclusions conform closely to India's current and Fifth Plan strategy and should be a means for promoting closer Asian cooperation and self reliance. It is important that the promise of decentralised programming should be kept so that the FAO Asian office programme can conform to Asian realities. A two year feasibility survey in which 12 Asian countries from Iran to Vietnam joined has resulted in a plan for the setting up of an Asian Telecommunications net work by 1975 at a cost of $30 million. Such a network will pay for itself and will promote trade, tourism, meteorology, aviation and information in the 12 countries. It is now necessary for the countries to set up regional machinery, raise the capital, train the needed staff and so execute this important project. Many of the Second Development Decade targets for their realisation in this region call for this telecommunications network. Another cooperative programme is Ecafe's Asian Investment Centre which will assist the countries in attracting and nurturing investment, which together with the proposed Technology Transfer Centre will assist the countries in negotiating contractual arrangements for the tranfer of technology and industrial joint venture. UNCTAD has computed that the foreign exchange costs for the transfer of technology which stand at $1,500 millions at the end of the sixties will increase to $9,000 millions at the end of the seventies (the Second Development Decade) for the developing countries. This is a heavy burden amounting to 5 per cent of their exports, 40 per cent of their debt servicing and 56 per cent of the flow of private foreign investment. And to this should be added the over pricing of their intermediate imports to the developing countries and profits on capitalisation of know how. It is time that the Asian countries moved to establish more equitable terms of investment and technology transfer with the developed countries.

The European Common Market: The October meeting of the heads of government of the 6 Common Market countries and the three new countries,—UK, Denmark and Ireland—who are joining the common market on January 1, 1973, has resulted in an economic and monetary union of the 9 countries. It endorsed the monetary cooperation fund of 1.4 billions pre devaluation dollars (referred to in the last issue) and the first phase in 1974 of the full economic and monetary union to be attained by the end of 1980. It also declared that at that time the enlarged common market will develop into a European Union". Necessarily this summit of leaders of most of West European countries were concerned with immediate technical problems, regional policy, industrial and social policy, leaving for the future the working of the larger policy and political issues of the Union, including the status of the European Parliament and the Commission. What is important for the world including the US and the developing countries is that the enlarged community should not be inward looking. From this point of view, its declaration that the community and each of its members will follow the UNCTAD decisions and the Second Development Decade strategy in the matter of development cooperation is important. This includes not only increasing the volume of official aid and improving its terms but also promoting the export trade of the developing countries. In particular prices of primary products should be established and GSP should be applied to the manufactures from the developing countries. In particular, the Prime Minister of the UK has impressed on the enlarged community the need to

enlarge its external relations to include India, Pakistan, Bangla Desh and Ceylon. The decision to increase imports from the developing countries by 15 per cent is of particular importance to this group. India has high stakes in seeing that this declaration does not remain a paper intention like the UNCTAD and Second Decade declarations. UK is India's largest export market accounting for 48 per cent of our tobacco exports, 37 per cent of our tea, 20 per cent of our woolen carpets, 24 per cent of our textiles, oil cakes and coir manufactures each and 21 per cent of our leather and sugar exports respectively. In fact whilc the UK alone imports the equaivalent of a total of all our exports to the EEC countries, our imports from the latter is over double that of our imports from the UK as the following table shows:

	India's Exports to		India's Imports from	
	UK	EEC	UK	EEC
	(in lakhs of rupees)			
Unmanufactured Tobacco ...	62	62		
Sugar ...	173	—		
Cashew Kernels ...	107	119		
Coffee ...	20	120		
Oil-cakes ...	866	42		
Jute goods ...	428	163		
Textile goods ...	1,265	338		
Machinery other than electric ...			3,683	5,959
Electric Machinery ...			1,143	1,930
Transport equipment ...			1,595	100
Fertilisers, manufactured ...			238	1,400
Non-ferrous metals ...			502	2,574
Chemical elements and compounds ...			558	1,554

We have four years time in which to renegotiate our trade with the UK and other members of the enlarged community to translate the declaration into a reality. On its aid programme, the October meeting of the Development Assistance Committee of OECD has called on members like Japan and West Germany to increase their aid, to make up in part for the decline in US aid and for all countries to improve the terms of aid through untying and softer terms. This is yet another call to the enlarged community for action.

World monetary situation and the World Bank: There is nothing further to review since the last issue of the Bulletin on the issues involved in the world monetary reform, except that the IMF President remains rather guarded about the progress of the work of the Committee of 20. Meanwhile the pound fell to its lowest level to $2.3940 at the end of October, which is a 15 per cent drop since June 23 when it was floated. This speculative movement, however, is being corrected as the time approaches for UK to announce

its parity. Japan is undertaking a programme of expansion of imports, curbing of exports, capital liberalisation, increased aid and expanded social welfare in order to ward off the prospects of another Yen revaluation. The world Bank in addition to its lending programmes in education, water supply, sewerage and population control, has entered the field of financing of small scale industries. This programme will help the development of an outward orientation in industry and avoid inter sectoral imbalances. The World Bank President has again called the attention of the UN General Assembly (see last issue of the Bulletin) to the fact that the state of development in most developing countries is growingly unacceptable. The developed nations are not moving effectively to help the developing ones and the developing countries are not moving to help the poorest 40 per cent of their population. 80 per cent of economic growth in the past 10 years has been recorded in countries with a per capita income of $1,000 and over and they contain only one quarter of the world population. On the other hand 6 per cent of the increase went to countries with a per capita income of $200 or less, in which 60 percent of the world lives. He points to the futility of the development theory that growth will reach down to the poor in 10 years (it has not done so in 20 years in our Country), and says 10 years is too long for the poor farmer and the unemployed to wait. There is need for a head on attack against poverty. This sounds like the theme of our Fifth Plan strategy.

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Agricultural Development

Paddy: The Kuruvai paddy harvest has been completed in good shape. The average yield this year has been higher at 2 to 2.5 tonnes per acre with Karuna and IR-8, compared to the yield of 2 tonnes reported last year (Vol. I No. 11 of the Bulletin). This improved yield could be further extended by applying fertilisers in two or three doses and by applying it after draining the field and periodic tilling. This improved management of the high yielding paddy varieties is slowly spreading and vigilant extension services can help to generalise and increase next season's harvest. The Kuruvai harvest like last year's (see Vol. II No. 7 of the Bulletin) escaped for the most part damage from rains in the Thanjavur district. In fact Samba and Thaladi cultivation got under way normally. By mid October, 7 lakh acres of Samba transplantation and 10,000 acres of Thaladi transplantation were completed. But there has been a problem with the price. A combination of the Deepavali seasonal resource needs of the farmer, some fall in demand both in the State and outside, and the application of the rule of moisture content by FCI led to some distress sales and fall in paddy price. These three forces depressed the price of kuruvai paddy to Rs. 28 per bag (57 kilo bag) against the FCI price of Rs. 30.21 per bag. Even out-of-state merchants purchased kuruvai paddy at Rs. 30.50 per bag with the gunny. A further reason for this lower price was that though there are 150 purchasing centres opened by the government, cooperatives and FCI, some of them were inactive. The FCI had not received instructions about the Rs. 2 increase per quintal in paddy procurement price reported in the last issue of the Bulletin. And on top of it all, FCI insisted on applying its maximum of 15 per cent moisture rule for paying the Rs. 30.21 per bag, with a penalty of one kg. of paddy for every one per cent extra moisture. The district authorities should review this situation and take corrective measures. In this matter of moisture, it has now been established that the period between flowering and harvesting is decisive. For the high and early yielders it is around 20-25 days—that is

harvesting should start 20 days after 50 per cent of the paddy crop has flowered and should be completed in 5 days, so that it will escape the rains and avoid suncracks and broken grains. The moisture will then be 12 to 14 per cent. For low long yielders, the duration is 30-35 days. The Emergency rabi paddy programme as applied to this State involves the intensification over 5.58 lakh acres of Navarai paddy cultivation. This programme will operate particularly in Chingleput, North Arcot and South Arcot districts.

Other emergency rabi crops: The remaining Emergency programme will cover 1.3 lakh acres of jawar, 70,000 acres of ragi, 41,000 acres of bajra in the five districts of Coimbatore, Salem, Madurai, Tiruchirapalli and Thanjavur. The Rs. 10 crores plan for pulses includes 2 lakh acres in Thanjavur district. The Emergency programme should use the new high yielding hybrid cumbu 4B-8 just released by our Agricultural University. It has an average grain yield of 2,570 kg. per hectare compared to 2,120 kg. of the traditional variety and can be grown under both dry and irrigated conditions. In view of the decline in groundnut production due to the paucity of rains, reducing the area sown by 30 per cent and leading to a decreased 20 per cent in yield, a special programme is planned to increase groundnut production over 1,50,000 hectares in the six districts of South and North Arcot, Chingleput, Coimbatore, Thanjavur and Madurai. This will, it is hoped, prevent a rise in oil prices next year.

Cotton: The State's cotton production is 4 lakh bales per annum and it has been that for the last 5 years, which is 8 per cent of the Country's cotton production. The spinning mills in the State (of which we have the Country's majority) consume three times the production — (11-12 lakh bales). The one effort to increase our cotton cultivation using PRS-72—the most advanced strain—in the Thanjavur areas, for which a strong case was made (see Vol. I No. 9 of the Bulletin), has had mixed results. First, last summer's target of bringing 10,000 acres under cotton cultivation fell short by 3,000 acres. Second, the crop suffered from unfavourable weather conditions and pests which the inexperienced farmers could not deal with. Third, there were marketing difficulties and so the government arranged for merchants from Tirupur and Coimbatore to purchase the cotton stocks in the Thanjavur area, which was not too satisfactory. For this year there is a further problem with regard to prices which have fallen from last year's Rs. 330 per quintal to Rs. 180-215 per quintal. An attempt, however, should be made to grow cotton in Thanjavur as a summer crop, in order to diversify the one crop economy of this district and to promote cotton growing, a ginning factory should be established in the district, which will solve the marketing problem. Given the irrigation facilities of the area, a third crop in oil seeds or pulses should also be promoted in the district. The bye product, cotton seed from PRS-72, MCU 5 and Sujata can also be used as pointed out in Vol. II No. 8 of the Bulletin for extracting oil and using the cake as cattle feed, after setting apart the seeds necessary for sowing and keeping the different varieties of seed separate. With the rising oil prices, this subsidiary of Thanjavur cotton should be actively promoted.

New plant and crop varieties: New plants with short duration and higher yields that are essential to the growing multi cropping farming pattern are now coming into use. In paddy, Kannagi is one such with a 100 day maturity, resistance to pests, and yielding 72 kg. per hectare of medium quality rice. Kannagi has thus advantages over Karuna

and fits into a 3 or 4 crop pattern. Varieties of pulses, both red gram and green gram, have also now become available for multiple cropping, with shorter duration and a yield of 27 kg. per hectare compared to the 17 kg. of the normal varieties. The Nilgiris vegetable programme (see Vol. I Nos. 1, 4 and 7 of the Bulletin) has introduced a variety of short duration and high yielding vegetables which can be grown both in the hills and in the plains during the months of November and March. These new vegetables include two varieties of cabbages which mature in 90 and 120 days respectively compared to 150 days of the local variety, with a little lower yield in the case of the first and 46 per cent more in the second: two cauliflower varieties which yield in 90 days twice (18,000 quintals per hectare) the amount of the local cauliflower; two Brussel sprouts varieties grown in 180 days and yielding 20 tonnes per hectare. Two varieties of beans, stringless and pole, which yield 30 to 70 per cent more: sweet peas yielding in 80 days 82 quintals per hectare, have also been developed. Similar improvements have been brought about in fodder beet and carrots. The Nilgiris project has not only justified itself but its results can now be spread through the State. The SFDA in South Arcot—the only one in the State—could be made into an instrument for introducing new plants and new vegetables. Its one year record is satisfactory in training over 600 small farmers in modern agricultural practices, in developing vegetables and coconut seedlings, in purchasing 4 tractors for hiring out to farmers and in spreading the use of hand operated sprayers to 1,200 farmers. It is more than time to establish one such agency in the 8 districts with a large small farming and dry farming population.

Poultry farming: Further to the perspective plan for poultry development in the State referred to earlier, a start has been made in extended poultry farming in four districts — Coimbatore, Madurai, South Arcot, and Tiruchirapalli — with a view to increasing the production of eggs in the State by 1 lakh. Of the 30 lakh eggs consumed daily in the State, around 6 lakhs are imported from the neighbouring States of Andhra Pradesh and Kerala. The Tiruchirapalli district's Rs. 40 lakhs scheme inaugurated in October covers 1,700 small farmers and agricultural labourers. Each person is to develop a poultry unit with 100 hybrids on the basis of a State Bank loan of Rs. 2,250 at 4 per cent interest. The cost benefit feature is after 18 months, each unit will have a net return of Rs. 1,700 per annum—a useful addition to the low incomes of the poor sector. A decisive element in the programme is the collection and marketing of eggs and the provision of advisory services to ward off epidemics. This is the next stage which should be assured.

Tea: In the last three issues of the Bulletin, the financial needs and the production and export trends of tea were reviewed. The recent meeting of the Tea Association of India throws light on the consumption pattern of tea within the Country. Contrary to popular opinion that Tamil Nadu is essentially a coffee consuming State, the inter-State tea consumption statistics shows that Tamil Nadu is the third largest consumer in the Country (1.7 crores kg.), after West Bengal (3.9 crores kg.) and Maharashtra (2.9 crores kg.), followed by Gujarat (1.5 crores kg.) and Assam and Andhra Pradash (1.3 crores kg. each). The consumption pattern for the future is on the rise—it is the poor man's beverage and so an annual production increase of 3 per cent should be envisaged. For 1973-74, a target 460 million kgs. is envisaged. The Dutt working group recommendations on term finance must be put into effect for this season's production, if the target is to be achieved.

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Industrial developments

***Prospective Industrial slow down*:** The 25 per cent power cut in effect since 1 October, as pointed out earlier, is leading to a slowdown in the State's industrial activity. The Southern Indian Mill Owners Association (SIMA) has made a computation on the effect of the cut on the textile industry in the State—which is somewhat staggering. This slowdown is entirely the result of the power cut, as with a good cotton and yarn supply position, increasing demand, and the modernisation programme of units like Madurai Mills, the industry was poised for a major expansion. Further plans for merging marginal and sub-marginal firms will now have to be postponed. The effect on prices will also be an upward. SIMA has just announced an increase of 29 paise per kg. of staple fibre yarn from November 1 and this increase is due to the rise in costs, particularly of Viscose staple fibre. It does not include the rise in manufacturing cost due to the power cut and that is still a Damocles sword hanging over our heads. The direct losses computed for the textile industry in the State are Rs. 5.5 crores in production, a wage loss to 1,180,000 workers of Rs. 47 per month, and the lay off of 40,000 workers—at a time when we are trying to generate employment. The quantitative production cut will be 40.6 lakhs kgs. of cotton yarn, 34.8 lakh metres of cloth and 4.6 lakh kg. of staple fibre yarn per month. The effect on other power intensive industries in the State will be equally serious and unless emergency action is now taken (a) to set up the cooling system in Ennore (b) to get Neyveli to at least 50 per cent of capacity and (c) borrow from Kerala, there will have to be further cuts in power and serious effects on production, employment, prices and wages.

Salem Steel: With the constitution of the Rs. 100 crores company, Salem Steels Limited, on October 25, the first stage of India's first major stainless steel plant has been inaugurated in the first of its 3 stages of production. Again as a first step in Indian steel history, this plant's first stage is starting backward with the rear end in order to economise on time and develop the necessary expertise. The first stage which is of 3 years duration will involve the establishment of cold rolling mills with imported hot rolled bands as feed stock and simultaneously capacity for the production of hot metal will be installed. In the second stage which will take the next 18 months, steel scrap will be fed into electric arc furnaces and converted into stainless steel by the vacuum decarbonisation process—the latest technology in use for this process. The third and last phase of the plant which will run into a further 18 months will involve producing high silicon electrical steel by smelting the Kanjamalai ore in electric pig iron furnaces. The capital of this Rs. 340 crores plant will be expanded as, when and where required. It will be a subsidiary of the steel Moulding Company (see Vol. II No. 9 of the Bulletin). The Plant Director, Mr. V. Subramaniam, is now over seeing work on the 1,000 acres land and plans to set up a stainless steel development cell to build a market and stimulate new and sophisticated uses for this kind of special steel. The State Government is making electricity available at a specially low rate of 5 paise per kilowatt hour, which will neutralise somewhat the high cost of production of the product. Now the ancillary and subsidiary industries around Salem Steel should be planned and executed in step with the 3 phases of the plant.

SPIC: The South Petro Chemical Industries Corporation (SPIC) (see Vol. II No. 3 of the Bulletin) with the world's largest single unit 1,600 tonnes a day urea plant and plants for ammonia (1,100 tonnes a day), NPK (600 tonnes per day), sulphuric acid (500 tonnes

a day) and phosphoric acid (165 tonnes a day) as our second largest joint sector is not only keeping to its tight time schedule to go on steam by July 1974, it is keeping the public fully informed of the work in progress by its useful publications. Its 4 million gallons storage reservoirs is now half way through to use the 20 million gallons of water from Tambaraparni. A high tension energy station is being built by the State Electricity Board and the foundation is being readied for installing the Tiruchi BHE boiler and water treatment plant. Situated 8 km from Tuticorin near the deep sea harbour under construction, it has set up its own break water ramp for receiving the heavy equipment and machinery from Japan, before the harbour is completed. SPIC will be able to meet the growing fertiliser demand of the State's Fifth Plan and also make available around 25 per cent of the fertilisers needed by the other Southern States.

Simplifying licensing procedures: The report of the sub-committee of the State Industries Development Committee on simplifying licensing procedures issued in August makes remarkable reading. First it brings together existing regulations in the industrial field, which makes one wonder how we ever moved into the industrialisation stage so far. The industrial field, which is classified into (a) the core sector (agricultural inputs, iron and steel, nonferrous metals, petroleum, coking coal, heavy industrial machinery, ship building and dredgers, newsprint and electronics), (b) the heavy investment sector (involving an outlay over Rs. 5 crores), (c) the middle sector (involving an investment of Rs. 1 crore — Rs. 5 crores) and (d) the de-licensed sector (which has now in effect been abolished) reads like the mazes through which Alice wandered. Large industrial houses and foreign companies can invest only in the core and heavy investment sector. The middle sector requires a license but larger industrial houses or a dominant undertaking as defined under the MRTP Act, any undertaking requiring more than Rs. 10 lakhs or 10 per cent of its capital in foreign exchange, any unit requiring Rs. 5 lakhs or 5 per cent of its product for import of raw material must obtain a license. The acceptance of the joint sector, the discontinuance of the "banned list" and the permission to expand capacity to the 54 (now 65) critical industries are a few positive elements. The sub-committee points to the bottlenecks caused by the existing procedures such as the exclusion of the larger undertakings and the working of the dominant undertaking provision which excludes the most competent units from expanding their capacity and contributing to industrial growth, the current procedures which call for separate and time consuming reviews to obtain a letter of intent, a capital goods import license, clearance under the Monopolies Act, approval of the Foreign Investment Board, clearance by the MRTP Board and the Economic Affairs Committee of the cabinet for larger or monopoly houses, the ICICI feasibility study, import license from the Chief Controller of Imports and Exports, and when all this is done, the Reserve Bank's approval to open a line of credit, by which time the particular line of credit may have dried up. Foreign collaborations have to be approved by the CSIR and the changes in the terms it may propose involve further endless negotiations. The general outcome of the study of this report is not that our industrialisation should return to some kind of chaotic laissez faire. There have to be directives and controls, to ensure that the industrialisation conforms to our national objectives of growth, stability, social justice and self reliance. The solution is two fold. First as the report recommends, concurrent clearance of applications by the various departments of government should be arranged as is now proposed for public sector undertakings through the function of the Public Investment Board. Second the guidelines

should be sharpened and should be self-enforcing so that there is no need for a costly, time consuming and not very efficient administrative machine. The recommendations for a pack clearance scheme for imports, alternative journal advertisement, standardising the terms of foreign collaboration, raising the exemption limit from licensing, promoting R & D through using it as a criteria for licensing and scrapping all licensing procedures when indigenous technology and machinery are used — are cases in point. There is then left the biggest issue — and that is the development of a trained, efficient and honest corps of administrators to execute such a rationalised programme. For this there may be a case for setting up an autonomous executive corporation with flexible terms and conditions of service and procedures to carry out this vital and sensitive programme.

SIPCOT : The annual general meeting of the State Industries Promotion Corporation of Tamil Nadu (SIPCOT) provided a useful glossary of the many abbreviations that are in use in the State in the industrial development field, employed also in Vol. II No. 5 and other issues of the Bulletin. SIPCOT promotes industrialisation by the private sector, particularly of the State's backward areas through the package incentives schemes, financial aid and ancillary services. TIDCO establishes medium and major industries in the State and private sectors. TANSI establishes and runs small scale industries. SIDCO helps small scale industries in the private sector. TIIC whose status has been enhanced by the IDBI staff appointment, is the financial institution for financing industries. The first year's report of SIPCOT, which is really a 3 months operational report is creditable — Rs 24 lakhs in term loans to 9 projects, a credit guarantee scheme for medium industries and a consortium aid scheme, underwriting 10 per cent of the subscribed (risk) capital, particularly for entrepreneurs entering backward areas, 7 feasibility studies and 12 preliminary studies, free of cost if below Rs. 10,000 or otherwise subsidised for entrepreneurs starting undertakings and needing this aid. In addition SIPCOT is readying itself to develop growth centres by providing, the infra-structural facilities (at first 700 acres area at Ranipet has been chosen) for them, to administer the State's scheme of interest free sales tax loan and the Union scheme of 10 per cent grant or subsidy to units developed in the industrially backward regions. This is quite an impressive and ambitious programme. The main bottleneck that SIPCOT will face is personnel—trained and experienced persons to make feasibility studies and even more to build and interpret the very complex systems models which the development of growth centres will call for. It refers to the State Planning Commission, which is itself a broken reed as far as expert staff for such expert intensive projects as growth centres are concerned. The other problem that SIPCOT will face is our interminable procedures both with the Union and State Ministries and departments as well as our term lending institutions. If SIPCOT can itself take over some of these functions and get these bodies to simplify and rationalise their rules and expedite decisions, it would be really promoting the State's industrialisation. Before rushing around trying to expedite action on letters of Intention, if only the time-lag involved in obtaining the letter can be reduced, the chances of the letter when issued still corresponding to the real original situation will be enhanced and its implementation will suffer no delay.

Backward areas development : The recently issued letter of intent for the setting up in this State, in technical collaboration with General Tyres, USA, of a tyre factory is a good start. If only the license also could have been approved including the terms of the collaboration agreement, there will be real progress. The factory is to be located in

Ramanathapuram and will be eligible to the concession for its backward area location. In fact with the setting up the Enfield unit in Anaikaraipati in Ramanathapuram to manufacture 14,000 motor cycles, around 20 units are being set up in that district for the manufacture of automobile components—wheel hubs, brake drums, clutches, stampings, clutch plates, flywheel, electro plating of motor cycle parts, etc. The other new units being set up in the backward districts of Madurai and Tiruchirapalli as well as Ramanathapuram are turning out aluminium circles and sheets, calcium carbide, chain cover studs, crank pin plugs, steel forgings, agricultural implements, etc. The Union Government's report is that Tamil Nadu stands foremost in the Country in its industrialists moving into the backward areas. Claiming the 10 per cent subsidy to the projects' capital cost, Tamil Nadu has received Rs. 10.06 lakhs out of an all India total of Rs. 17.08 lakhs. This is a paltry sum and even when multiplied by the coefficient represents a little over 1 crore for this State, and less than 70 lakhs for the rest of the Country in developing our 300 odd industrially retarded areas. There has to be a much more vigorous action programme by SIPCOT and SIDCO to develop these regions.

Hindustan Photo Films: The ills of Hindustan Photo Films (see Vol. II No. 9) continue in financial and quantitative terms. After 5 years of functioning, 50 per cent of capacity is unutilised, production is erratic, for every 100 metres at the base casting, only 36 metres of X-ray, 54 metres of cine film and 83 metres of carbide papers come out—a high rate of rejection. On just excess scrap, the firm has lost Rs. 12 crores. And so funds for depreciation are diverted to inventories and stocks. And yet this Ootacamund public sector unit set up hastily 10 years ago with little foreign collaboration is now beginning to turn the corner. It could have done this much earlier at heavy cost (Rs. 10 crores) with the help of a foreign firm. But it has slowly and painfully built up its own technical expertise in a new technology. With just Rs. 10 lakhs of balancing equipment, the machinery has been adjusted to use indigenous raw material and a functioning agreement reached with the Mandya authorities on acetate of the desired quality. Now the engineering and technical staff can manage the equipment and by next year full production will be attained. Already the volume has increased and the percentage of rejects fallen. On this basis an expansion of the unit is justified. In its first stage of expansion the capacity of X-ray films will be increased from 1.5 million ot 5 million square metres, the second stage will be the production of colour films and in the final stage the entire film and still photographic needs of the Country will be met. It is sound that the first stage be completed during the Fifth Plan. Now the unit needs a period of industrial peace to take advantage of its many opportunities and developed facilities.

Handlooms: With stocks crisis reported in the last issue, the September fall in handloom exports in all varieties except Madras handkerchiefs is a call to intensified promotional efforts in the export frame. The steepest fall has been in dhoties (from Rs. 251 lakhs to Rs. 42,000) and lungis and sarongs (from Rs. 99.49 lakhs to Rs. 58.42 lakhs). Bed sheets, blankets and mulberry silk fabrics also declined and it is these that should be promoted in the UK and the European common market. The total situation for handlooms continues to be extremely disquietening.

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Education, Science and Health

Unrest in Education Institutions: October saw the continuation of student unrest in nine States—Punjab, Assam, Gujarat, Madhya Pradesh, Rajasthan, Bihar, Orissa, Andhra Pradesh and Tamil Nadu and in the Union Territory of Delhi. The immediate causes for this serious break down of academic life, with the almost total paralysis of education in two States, Punjab and Assam, could be classified under eight major heads. (a) Political. In Tamil Nadu school and college strikes and violence were due to students involving themselves in the DMK and ADMK party developments. In Andhra Pradesh they were due to demonstrations for or against the Mulki rules. (b) Linguistic. The second most terrible situation, that of Assam, (Punjab being the first) was caused by student reaction to the State Assembly decision to use Assamese in the Gauhati and Dilbugarh universities and set up a separate university for Bengali speaking Cachar district. Jodhpur disturbances included the demand for Hindi in law courses and examinations. (c) Employment. The Rajasthan medical students and house surgeons strike was due in part to the demand for ensuring employment, including an interest free loan of Rs. 7,500 for setting up a clinic in rural area. Jodhpur also raised the question of an unemployment allowance for its unemployed graduates. (d) Academic. Bihar disturbances have many causes but one is academic irregularities against which students have been protesting together with a demand for an expert commission to probe into them. The Madhya Pradesh agitation is against the recent ordinance suspending selection committees and empowering the Governor to appoint Vice Chancellors of the nine universities. (e) Student Union differences. One college in Tamil Nadu and disruptions in Junagadh in Gujarat are due to differences over student union activities and student union rivalries. (f) Grace marks. The Jodhpur (Rajasthan) university strike was among others due to the demand of the students for five per cent grace marks for the last final examination. (g) Bus and railway serviced bus fares. Delhi and Orissa students' disturbances was due the demand to re-route bus services and against the rise in bus fares. Two Tamil Nadu disturbances were due to the railway train not stopping at their college area. (h) Cinema prices. The terrible Punjab disturbances were sparked by student demand for reduction in cinema fares. The form these disturbances have taken are burning cinemas, railway stations and buses (Punjab, Tamil Nadu, Andhra Pradesh), stoning buses, automobiles, railway and their passengers (Tamil Nadu, Rajasthan), hijacking buses (Delhi, Bihar, Punjab), burning house (Assam), abstaining from classes (all the cases), use of lethal weapons (Punjab, Tamil Nadu, Assam, Orissa), gheraoing of a Union Minister (Rajasthan). The result is, deaths in police firing or student violence, (12 in Punjab including four students, 1 student in Junagadh, 2 in Tamil Nadu, 14 in Assam including 2 students), teargassing of students in most places, serious injuries to the police in all the States. Nagpur University has decided to establish its own security force to protect its properties. There is need for a serious consideration of this situation by students, teachers, parents, university and college authorities and government as to where we are going educationally. What is called for now is reform of the economy and education and certainly not more of the same education and economy which has produced the situation. There is also need for the academic community—students and teachers to return to academic ways of peace, objectivity reason and order.

Educational reform developments; The October Education conference in Sevagram attended by educationists, vice chancellors and some education ministers was opened by Prime Minister who highlighted the government's decision to change educational policy to

make education purposeful and serve the needs of the people. She emphasised the scope of education as not covering only schools and colleges but all of life. Every workshop and farm should be a centre of learning and education so conceived starts from birth and never ends. A second point made was the need to link education to the development programme of the Country and to make all education work-based. A third emphasis was to change the class character of our present education. These three features—continuing education, vocationalised education and democratisation of education—are at the heart of the policy changes now needed. The conference made useful recommendations on the reform of examination, decrease of vacations so that the facilities are more fully used, making available lands for school work and out-of-school education—all of which are part of the emerging consensus on educational reform. The pre school Education Conference at Bangalore also in October noted with deep concern the turning away from the school of over 60 per cent of students before reaching Class V and emphasised the absolute priority to first level education in the Fifth Plan. It recommended an integrated governmental child care programme of pre school education, nutrition and health care for a selected number of pre school children in the rural, urban and tribal areas. A start in compensatory education for students from the disadvantaged sector of this State is being made with the launching of a scheme to provide special classes in English for backward class students in Standards VIII to XI. Every year 300 boys are to be accommodated in the Presidency College and given 3 weeks of intensive training in reading, writing and speaking English and also through work in the lending libraries. This programme which is jointly run by Tamil Nadu government and the British Council at an annual cost of Rs. 1 lakh will benefit the Institute which coaches backward class students for all India examinations. In addition 260 Scheduled and Backward class first year B.Sc. students from all over the State have been given special coaching from September 16 to October 7 at the Presidency College, Madras, in Physics, Chemistry, Botany, Biology, Zoology, Mathematics and English. A similar course will be run in the summer. A recent study of the Indian National Science Academy reports that co-educational schools perform much better educationally than schools for either boys or girls only. The higher the girl-boy ratio, the better the educational attainment, as the boys or girls are no longer curiosities but "take their proper place in the scheme of things". The percentage of first divisioners in co-educational schools is almost double that of segregated schools. The report concludes that co-education is a vital element at the primary school level because "attitudes of boys and girls are shaped at this stage ". These findings are important for the reformed school system being envisaged for the Fifth Plan. The Madras Seminar on Chemistry evaluation in October has recommended a phased examination reform: (a) questions should not be essay type but objective type, with multiple choices, multiple complexity, comparison, short notes (b) internal evaluation should be emphasised (c) viva voce, seminars and project work should be used. A questions bank should be set up. Teacher education and educational research received particular attention at the Teacher Educators Conference in Perianaickenpalayam. The proposal to set up a National Council for Teacher Education and State Boards of teacher education during the Fifth Plan was announced in order to involve teachers in planning and implementing the coming educational reforms, to provide them with continuous inservice training on a massive scale and to improve their conditions of service. In light of the break down of the system all over the Country, the need for a constant scrutiny and redefinition of the educational system, objectives, professions and practices in light of the changing conditions in the Country was urged. There was also agreement for the Universities to develop intensive teacher

education research and in particular devise good and reliable psychological tests. In higher education three developments should be noted. The Minister of Education has recently announced that the Presidency College, Madras, may be converted into an institution of post graduate teaching and research. The Madras University Vice Chancellor has come out in favour of autonomous colleges in the State, which would enable them to hold their own reformed examinations or use the internal assessment system. The Union Ministry of education has set up a working group to consider the feasibility of establishing an open university in the Country, under which those who are employed and have not been able to take under graduate or post graduate degrees will, through correspondence courses, television and radio programmes, summer courses, regionally organised tutorial and counselling services, that is, through their own guided efforts, study a wide range of courses, following inter disciplinary approaches. A study team will visit UK to see and learn from the open university functioning then. The State Planning Commission's Plan for education, science and technology, proposes that by the end of the Sixth Plan, there should be more such students doing their university studies outside the universities than those in, along with all the reform noted in this sector.

Technical Education : The Minister of education has once more stressed the urgency of technical education in the State being directly linked with production, oriented to problem solving and geared to constant improvement and change in industrial methods. For this the technical education institutions must draft their syllabi and curricula with the help of the industrialists and the industrialists on their side further the professional development of the technical personnel they employ. This will be the major raison d'etre of the Technological University recommended by the State Planning Commission's educational plan. The newly established Industrial Liaison Board in the directorate of technical education will be one instrument for achieving this integration industry and technical education. In this direction, the recent meeting of the Central Printing Technology Committee at Madras has recommended increasing the practical content of diploma courses in printing, developing a sandwich course and providing continuing training to diploma holders. A production-cum-training wing in each of the 4 regional printing schools plus a Research and Development Centre in printing and allied technology in Madras as a means of reducing our import needs and promoting self reliance were also recommended. Now it is for the Union and State governments and the institutions to give effect to these important recommendations. The Technical Teachers Training Institute in Madras through its curriculum development cell is working on the curriculum for industrial electronics—a new and growingly popular subject in our polytechnics. The curriculum developed has resulted in the development of three kits of laboratory equipment manufactured out of indigenous equipment and material which can now be mass produced by the electronic firms. More of such updating with local materials of our engineering and science curricula is needed in our institutions. In the field of technical education, two new types of institutions have been established. 19 private sector banks in the State and Mysore and Kerala have joined together and established the South India Banks' Staff Training College in Coimbatore under which bank officers will be trained in agricultural and small scale industries financing, conducting surveys on banking problem of local interest and generally in bank management. The banks have 1,258 branches and 11,000 staff and this training programme can help the banks in the new tasks incumbent on them in rural development. It has been computed that by 1986, the commercial banks will need nearly 13 lakhs of trained staff and this type of institution will have to be

multiplied many times over to meet that need. A college of vocational studies has been established in Delhi by the Delhi University which offers a 3 year B.A. degree in book publishing, retailing and trade, office management and secretaryship. Now a course in tourism has been started which will involve like the other courses both class room work and on-the-job experience. Only in this college, no one will have a B.A. in secretarial work, for instance, unless he is a good secretary. This is work oriented education and a needed change in our very concept of higher education—a change which our State and Country today call for.

Science: The Approach Paper for the Science and Technology Plan (see Vol. II No. 9 of the Bulletin) to be integrated with the Fifth Plan has been finalised by the National Committee on Science and Technology with the double aim of spending 1 per cent of GNP on R and D by 1980, and of investing Rs 2,500 crores during the Fifth Plan. The tentative sectoral allocations listed earlier shows only Rs. 350 under scientific research but if the R & D built into all the sectors—government research institutions, private industry and universities are taken into the total recommended will be achieved. The priorities for research proposed are food, health, housing, family planning, power and development of natural resources. While a critical mass in resources is needed, it is the quality of research and its innovation producing results that will generate both support and resources. In this effective transfer of results from the laboratory to industrial and agricultural areas, the agreement concluded on Indo-Soviet scientific cooperation will be useful. There will be visits by Indian scientists to the Soviet Union to see for themselves this transfer process, there will be joint R & D projects such as the correction problem in tropical conditions of rubber articles, machine tools, studies on industrial and civil buildings, light industry, oil refining, petrochemicals, an institute for welding and development of steel and other joint projects. The legislation under consideration to declare water a national asset is a policy matter but its scientific implications should be debated and studied by our scientists. In addition to the designs for 7 ghz narrow band micro wave systems with a capacity of 300 speech channels designed by the Telecommunications Research Centre and being manufactured by Indian Telephone Industries in Bangalore, the government is purchasing from Canada wide band micro wave equipment with a capacity of 1,800 channels capable of carrying two TV programmes and linking Bombay, Mangalore, Mysore, Bangalore, Madras, Ernakulam, Calicut and Trivandrum. The next stage is for our research centres to move into this design area.

Health: The six day nuclear medicine exhibitions at the Madras Medical College has been a useful introduction to these new health developments for the public. Through photographs, models, components and instruments, it demonstrated how radio-isotopes can be used as tracers and scanning agents to disclose thyroid, kidney liver and spleen ailments. It also showed how they are used in agriculture, industry and food preservation. The exhibition should tour the State as a valuable means of health education and popularising nuclear developments. The National Health Project which involves the use of rural (indigenous) medical practioners, auxiliary medical staff and other para medical personnel to supplement the work of Primary Health Centres and subcentres is meant to provide full medical coverage to rural people. At present only 32 per cent of allopathic doctors are available to serve 80 per cent of the rural population, while 68 per cent of them are serving the 20 per cent urban peoples. Under the National project, the indigenous doctor is paid

Rs. 150 per month plus 10 paise on each prescription, which will average his salary at Rs. 300 per month. The training of these doctors has been extended from 4 to 6 months. Tamil Nadu, as recommended by the State Planning Commission's plan on Health (see Vol. II Nos. 8 and 9 of the Bulletin) has informed the Union Government that it prefers to strengthen the programme of Primary Health Centres and mini-health centres as its first priority. It will also act on the recommendations of the plan to strengthen indigenous medical services. A recent investigation at the Vellore Medical hospital as part of similar studies in New Delhi and Bombay, shows that the polio vaccine in use for children is not even one third effective in numbers. Of 191 infants and children under 6 investigated at Vellore who took the oral polio vaccine, it was found that only 30 per cent received protection from the vaccine and four of them were crippled by polio despite the vaccine. This is also the finding in the other two studies and is against the experience in the West. Is it the climate which reduces its effectiveness ? In any case a concentrated research programme is now needed to improve the impact of this vital drug for our pre adolescent generation.

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Employment : The three month employment survey from October-December 1971 by the Union Directorate General of Employment and Training confirms the theoretical findings reported at the Gujarat economic conference in October based on the four fold criteria of (a) labour force participation rates, (b) unutilised labour time, (c) subjective evaluation of the families in regard to the possibility of supplementing their incomes and (d) willingness or ability to spare at least one member of the household for full time regular employment, that the employment and unemployment conditions vary widely from region to region and generalisations for India as a whole in this matter are likely to be misleading. The DGET employment survey shows for instance a high rate of increase of employment in Himachal Pradesh, Pondicherry (5.4 per cent), Uttar Pradesh and Bihar (4.7 and 4.3 per cent) while in Tamil Nadu it was the lowest at 0.2 per cent. While the generalisation of the Gujarat conference that the problem of unemployment in rural areas is not serious and that families were not willing to spare even a single member for full time work are only those of very limited local situations, the conclusions that every rural works programme should be preceded by a quick survey of the local demand for different types of work, that young workers entering the labour force should be given shortened training in rural development programmes such as soil conservation, land levelling, bunding, canal lining, repairs of pumpsets, tractors, etc. and that the income augmenting programmes of the poor should aim in this way at increasing their productivity and not only through rural works which require a certain mobility of rural labour are sound bases for the employment generation programmes that are being devised and launched by States and regions. The labour survey shows that the average increase in employment was 1.3 per cent (1.4 per cent in the public sector and 1.2 per cent in the private sector), while the job seekers registered in the employment exchanges during that period increased by 3.5 per cent. Tamil Nadu shows the highest rate of unemployment among the States and slowest growth rate of employment both for educated and uneducated personnel. The State's many schemes to generate educated employment are timely. The first thing to do is to act on the recommendation of the most recent report of the State Administrative Reforms Commission to simplify, expedite and decentralise the clearances for self employment schemes. At present an entre-

preneur has to get 8 clearances for his scheme from Industries, Factories, Town Planning, Public Health, Local Body, Water and Electricity authorities. In place it is recommended that an Assistant Director of Industries get all these clearances for the entrepreneur. Second the present obsolete norms and rules and regulations should be reviewed, simplified and rationalised so that they promote and not restrict the self employment schemes. Third at the district level, the collector should chair a committee of the local technical officers to whom the clearances should be decentralised. These three reforms, which were also repeatedly emphasised by the Maharashtra State Small Scale Industries conference, which will be referred to later, will help substantially in increasing self employment in the small scale sector. Another initiative is the Tamil Nadu Government loan assistance to aid craftsmen in self employment. The present loan programme of Rs. 1,000 is being expanded and diversified to Rs. 5,000, Rs. 2,000 and Rs. 1,000 available to ITI graduates as interest free loans repayable on easy monthly installments for the purchase of tools and equipment. At present there are 1,400 ITI graduates who are unemployed. A third initiative is the work of a State Committee which in consultation with the Union, State and private industries is drawing up a programme of self employment for 2,000 unemployed engineers. Under this programme, each engineer will be given the needed capital through the nationalised bank loan, priority on raw materials, conversion of sales tax as a loan to be repaid later, along with a request to the Union Government similarly to convert the income tax into a loan. A fourth programme is the training programme of the newly established Tamil Nadu Agro-Service Corporation (TNASC) which has just completed one month training of 17 agro service personnel who will assist farmers in repairing and servicing their equipment and act as consultants to them on plant protection and farming practices. TNASC now plans to run 3 courses of 4 months each to train 40 technical graduates in farm equipment operation, sales, and demonstration and agricultural engineering. It is to be hoped that all these efforts will result in a more impressive performance on employment creation this year than that of last year (see Vol. II Nos. 3, 5 and 6 of the Bulletin). Last year of Rs. 25 crores allocated for combating educated unemployment, only Rs. 12 crores were approved and Rs. 9.6 crores spent employing 34,000 persons. For this year, out of the total unemployment provision of Rs. 47 crores, it is expected that all will be expended and 3.7 lakh persons employed. But so much of this, like the NCST schemes for employing engineers and scientists, the Union Ministry's education schemes and youth programmes and the Union Industrial Development Ministry's entrepreneur programme, are so much paper plans, and so much bound up with time consuming procedures, that the ten fold expansion forecast (which is still small in relation to our 26 lakh educated unemployed referred to by the Union Planning Minister in his approach to the Approach Paper) is doubtful of realisation. In any case Tamil Nadu with its special problems of unemployment and underemployment must push ahead with this programme.

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Nehru Yuvak Kendras: On the occasion of the Country's Silver Jubilee Anniversary, the Union Ministry of Education is opening 100 Nehru Youth Centres in the Country in order to train young workers for employment and promote youth education, literacy and cultural programmes. The States are identifying the districts for such centres which should preferably have an ITI close by and college with NSC personnel and, an area of 15 to 20 acres, with temporary accommodation pending permanent buildings. Each

centre will be organised by a youth co-ordinator. At this starting stage Andhra Pradesh has been allocated 7 centres, Kerala 3, Mysore 6, Tamil Nadu 4 and Pondicherry 1. The South Zonal Selection Committee under the chairmanship of Dr. Malcolm S. Adiseshiah has met twice and selected 7 youth co-ordinators out of the 11 candidates nominated by Andhra Pradesh government, 4 out of 20 nominated by the Tamil Nadu government, 6 out of the 10 nominated by the Mysore government and 1 out of the 2 sent by the Pondicherry government. The Kerala government is still in process of screening its candidates for presentation to the committee. In the case of Tamil Nadu there is need to co-ordinate this programme with the State's Youth Corps programme. The programme should be launched now by the end of the year and could make a substantial contribution to the development and employment programme of the States.

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Maharashtra State Small Scale Industries Conference: The Vidarbha Industries Association (VIA) which is a non-government organisation promoting the rapid industrialisation of the Vidarbha region in every way, organised a two day conference in Nagpur, in co-operation with the Federation of Associations of Small Scale Industries of India, attended by 400 delegates (mostly small industrialists), to take stock of the status of small scale industries in the State of Maharashtra and Plan for their further development. The conference was preceded by a six month survey of 556 small scale industrial units (SSI) in 90 centres by Kiroloskar consultants. The result was one of the best documents on small scale industries produced anywhere. The survey shows the very low level of education of small industrialists (65 per cent of whom range from illiteracy to below SSLC) the majority are monoproduct units, they are mainly concentrated in urban areas, and they are hampered by innumerable regulations, rules and time consuming procedures. The majority of them cannot fill out the cumbersome application form—which runs into over 40 pages. The problems credit, marketing, quality control and raw materials that they face are mounting. There was a free and full exchange of views in plenary and the detailed recommendations were worked out in five panels. The 146 recommendations related to planning SSI, finance and credit assistance, infrastructures, marketing, raw materials and the State directorate. The most heartening aspects of the conference was the series of assurances given by the State Minister of Industries at the closing session with regard to simplifying procedures, expediting his department's decisions and increasing the volume of aid to SSI units. The one gap in the conference was that all recommendations were addressed to the government and governmental institutions, as pointed out by Dr. Malcolm S. Adiseshiah at the concluding session. This has two implications. First the moregovernment aid that is recquested and given, the controls will follow, because it is publi moneys which are involved. Second there was not enough self reliance. The question of how entrepreneurship is developed and strengthened was not debated. The documentation of the conference—the survey and final recommendation—is of high quality and has been issued without any delay—within 3 weeks of the manuscripts being readied. This is an indication of the effectiveness of the working methods of a voluntary body supported by a go ahead government.

Manipal: Manipal in South Kanara has developed into an outstanding banking and educational centre not only for Mysore but for the Country due to the devoted labours of a small group of educators and businessmen. It is the headquarters of the

Syndicate Bank, the most far sighted of our commercial banks, which is the only one to have (and prove successful) its headquarters in a rural area. Now Manipal and the Syndicate Bank are also taking the lead in inaugurating the first Farmers Service Society in the Country (see Vol. II No. 2). A meeting of the nationalised banks, Vice President of the National Commission for Agriculture, the Reserve Bank representatives, the State Minister for Cooperation on October 16th in Manipal have drawn up plans to launch this agency to help the small farmer. Manipal has also the Academy of General Education which has affiliated to it 6 arts and science colleges in various rural locations, a medical college, an engineering college, a law college, and colleges of education, dentistry and pharmacy,—all of high quality, largely residential and developed and sustained by private efforts. It is today an island of sanity in our rather lost educational world. The Academy should be established as a university to develop innovative programmes for which it is so richly endowed with personnel and in its rural location. The annual convocation and convention was this year devoted to a very thorough discussion of the subject, Education and Social Changes, on which Dr. Malcolm S. Adiseshiah delivered the convention address, and out of which emerged conclusions as to the kind of educational regeneration that the Country needs and Manipal can pioneer.

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United Nations Day: October 24 was celebrated in all schools and colleges of the State as the UN Day. The State organised in Madras a major celebration presided over by the Minister of Education. One of the colleges which used the occasion to inaugurate its College Union was the Guru Nanak College, a recently started college in the Guindy area. The college with a strength of 1,000 students and over 100 staff is founded in memory of Guru Nanak and attracts a wide cross section of students from the city and the surrounding rural areas. It has the potential to develop its programme, within the limits of university regulations, in relation to its rural and small industry surrounding, when it has its residential facilities. Another institution which celebrated UN day is the Jawahar Vidyalaya, a secondary school affiliated to the Indian Schools Certificates system, with very interesting pre-school educational programmes and vocational courses in electronics, sewing and dress making and shorthand, typewriting built into the curriculum. The school is run by Sree Seva Mandir, a 23 year old voluntary welfare organisation started and run by a small band of socially alive women. The Mandir runs two hostels, 100 of the 200 residents are from the very poor sector, and are maintained free of cost. The Mandir also runs vocational training programmes for women. Here again is a pioneering institution with valuable lessons for our education system.

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Council for Social Development

The Council for Social Development, Delhi had its annual programme review in October. The Council is emerging in the field of social development as the outstanding research organisation, somewhat similar to the position of NCAER in the area of economic development. The Council's research programme has three completed areas. Its study on the school lunch programme in Orissa is an impressive piece of work which raises once more the question as to whether, apart from the tribal children, the mid day

meal is a sufficient condition for school attendance or necceasary condition for physical growth, health, etc. A second study is an inter - State comparison—Tamil Nadu and Gujarat—of the family planning programmes, where again valuable guidelines for the programmes are provided, even while some sacred cows are killed off. A third study is an inter industry study, one in which there is a family planning programme and the other where there is none. The comparison might be a little unfair. The Council also runs a functional literacy programme for the Andhra Pradesh government and is now starting a programme to evaluate this effort. Another project to devise an integrated programme of non-formal education for rural women and a further one for rural youth are under preparation. Perhaps the most impressive project is the pilot research project for growth centres, which operates as a five year programme through 20 research cells all over India, collecting and collating the date and testing them to arrive at recommendations on this important phase of our rural development. The Council's technical direction and wise management are responsible for its having emerged as a major tool in development programming and monitoring for the Country.

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Third Annual meeting of the Advisory Committee MIDS

The third annual meeting of the Advisory Committee of the Madras Institute of Development Studies is being held on December 18 in the Seminar room of the Institute. The meeting will review and advise on the draft programme for 1973 submitted to it. The Agenda of the meeting includes :

1. Confirmation of the Minutes of the Second Meeting on Friday, the 26th November, 1971.
2. Report on execution of the 1972 programme. (3AC/1)
3. Revised Rules and Regulations of the Institute. (3AC/2)
4. Proposed programmes for 1973. (3AC/3)
   (a) Studies,
   (b) Monthly Seminars,
   (c) Workshop,
   (d) Conference,
   (e) Publication.
5. Other Business.

A report on the meeting will be made in the January 1973 issue of the Bulletin (Vol. III No. 1).

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Second Annual meeting of Heads of Department of Economics

Further acceptances for the 2 day meeting have been received from Dr. Gautum Mathur, Head of the Department of Economics, Andhra University, Dr. V. Rajagopal, Head of the Department of Economics, Tamil Nadu Agricultural University, Coimbatore, Dr. V. Anantaraman, Head of the Department of Economics, Indian Institute of Technology, and Dr. D. M. Nanjundappa, Head of the Department of Economics,

Karnatak University. Dr. P. Subramaniam, Head of the Department of Economics, Gandhigram Rural Institute, Gandhigram. Papers on problems and projects of Economics research have been received from Dr. A. Ramaswami, Dr. Huchappa and Miss M. Gajalakshmi. Papers on a refresher Seminar for Economics Research guides (Professors) and the Economics text book project have been prepared by the Director, Madras Institute of Development Studies.

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November Madras Development Seminar

The November Seminar paper, Microbes and Man, by Dr. T. S. Sadasivan, Professor and Director, Advanced Centre in Botany, Madras University, together with a summary of the discussion on the paper at the seminar chaired by Dr. Alladi Ramakrishnan, Director, Institute of Mathematical Science, Madras appears as the first article.

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Second Article

Another article, Engineers and Innovation, appears as the second article.

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Special Meeting of Seminar in November

A Special meeting of the Seminar on Wednesday, November 15, presided over by Mr. R. Venkataraman was devoted to the Subject, Public Sector Management Problems in India, at which Dr. Joseph Pois, Ford Foundation consultant presented a statement. The Seminar high lights appear as the third article.

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Special Issue

The December issue of the Bulletin is a special issue. This issue contains the Basic paper and the 11 articles written for the Seminar on Perspective Planning on which the Final resolution and summary of discussions were published in the last issue. A publication on the proceedings of the Seminar is being edited by Dr. Malcolm S. Adiseshiah and will be on sale in January by the Government Printing Press, Madras.

MICROBES AND MAN

By

PROF. T. S. SADASIVAN, *Director,*

Centre for Advanced Studies in Botany, University of Madras, Madras.

1. Historical :

1.1. *Biogenesis vs abiogenesis*: Twelve hundred million years seem to have elapsed before life appeared on earth. Information about earliest forms of life is fragmentary because they were so microscopic in size and so soft as to leave no fossil record in the sands of time. Nevertheless, it seems reasonable to assume that life began over a billion years ago through the gradual appearance of a form, sub-microscopic and possessing life-like properties.

One of the most challenging principles in biology is the theory of constant change and in studying microbiology the question of evolution of parasitism raises many new problems. In fact, as in many fields of biology, well-defined species are the exception rather than the rule amongst pathogenic micro organisms. Man emotionally resists the idea of change and, indeed, he fears change. Biological change is inevitable and as G. W. Gray has put it aptly, "the future can be better than the past — if we have the courage and the intelligence to accept change and adapt ourselves to the new conditions".

Study of microbiology as a discipline started less than a hundred years ago in France and Germany and the big names associated with the pioneering efforts were Pasteur, Koch and Lister. Pasteur was a colourful personality and he left an impress on problems of fermentation of sugars to lactic acid by micro organisms and more important in the discovery of the causal agent of rabies. The name of Koch stands firmly associated with anthrax, the fatal disease of sheep, cattle and man and later with work on tuberculosis and these studies led to his formulation of specific laws known as Koch's postulates, now so well known to every student of microbiology. To Lord Lister should go the credit of demonstrating the value of antiseptic techniques and, in fact, the use of carbolic acid to destroy mirobes revolutionized, at that time, surgical procedures.

1.2. *The Bacteria and the Fungi* :

The dramatic discoveries in bacteriology during the nineteenth century changed many thoughts on microscopic forms of life and led on towards the end of the nineteenth century to the discovery of sub-microscopic particles called viruses. Bacteria and fungi are found almost anywhere, in soil. air, water, food and in living hosts. The most predominant form is bacteria followed by fungi and actinomycetes. Perhaps one should include the algae also among micro organisms.

1.3. *The Viruses* :

Viruses are hardly classed as microorganisms as they may not be considered living entities in the accepted sense of the term. Nevertheless, their ultramicroscopic size and their effect on host cells seem to justify including them under the broad heading

'microorganisms'. Viruses are the smallest of the microorganisms ranging in size from less than 20 millimicrons (a micron is 1/1000th of a mm and a millimicron is 1/1000th of a micron).

2. Man's dependence on Microbes :

2.1. *The silent workers* :

Man's daily contact with microorganisms is in the soil. He depends for his food on the good earth. Here the microbes of the soil contribute most to soil fertility. An acre soil is estimated to contain eight tons of microorganisms and it is in soil that bacteria, moulds, yeasts, actinomycetes and protozoons carry on their many anabolic and catabolic activities in their natural habitat. There are many transformations that take place in soil, most important being the carbon cycle. The carbon cycle involves the whole gamut of organic residues. These are attacked by bacteria, fungi and animals. The predominant microbial types involved and the rate of the attack depend on the chemical nature of the residue, environmental conditions, temperature and the nature of the underlying soil. There is also the problem of degradation of pure substrates such as cellulose and chitin and this is largely taken care of by fungi and to a lesser extent by bacteria.

The nitrogen cycle is one of the most important for plant growth and agriculture. Comparing it with the carbon cycle, while carbon is made available to plants in a gaseous form as carbon dioxide by microbial fermentation, nitrogen is released as nitrate ions and this cycling of nitrogen is mainly achieved by biological processes.

In recent years man has been concerned with airborne spores as they constitute health hazards like for example, Farmer's lung disease and other respiratory diseases of microbial origin. Many viruses, including those of influenza, the common cold, virus pneumonia etc., are dispersed by air. Numerous plant diseases are also caused by airborne fungi and, indeed, many of the fungal spores have been collected at great heights and long distance dispersal is very important in the epidomiology of some crop diseases like the rust of wheat.

An interesting new thought is the role of microbes in space exploration. Scientists are toying with the idea of using microbes in space exploration as indicators to test the effects of weightlessness, acceleration, radiation etc,, in artificial atmospheres. They are also arguing that these microbes that can use carbon dioxide and give off oxygen, can be used in space ships to renew their air supply thereby doing away with heavy and cumbersome oxygen cylinders or air purification plants.

2.2. *Aquatic microbes* :

Let us now give a brief consideration to aquatic microorganisms. They are primary producers of organic matter in aquatic habitats and achieve it through the remarkable process called photosynthesis. Green algae are now used in laboratory controlled processes to determine possible substitution of land grown cereals and other crop plants. If these experiments, with what is called synchronous cultures of algae, would succeed there would be one more source of food for man. For centuries, man had knowledge of edible mushrooms and only in recent years vigorous efforts have been made to commercialize the mushroom industry. The algae, perhaps will have an edge over mushrooms as they can proliferate remarkably well in synchronous cultures.

2.3. *Microbial metabolism* :

Now we can examine in depth some of the very specialized metabolic processes microorganisms can critically perform. Vitamin synthesis is one such. There is a wide variation in the ability of microorganisms to synthesize vitamins and consequently a variation in the nutritive substrates that have to be supplied. There are some bacteria, fungi, algae and protozoa can synthesize all the compounds of this type and there are others that must be supplied with one or more of these vitamins to start off their enzyme systems. The inabilty to synthesize vitamins, however, may not reflect a complete absence of appropriate pathways. In general, mammals are unable to synthesize all the vitamins needed for their health and well being. Man must rely almost completely on his diet for his vitamin needs. However, some vitamins of the B group appear to be synthesized by the intestinal microorganisms *in situ*. The interrelations of the vitamin needs of man, the vitamin content of his daily diet and the role of his intestinal bacteria and yeast in synthesizing certain vitamins is a complex problem and it is only now this subject is being pursued with vigour.

2.4. *Microbes as a laboratory tool* :

There is an interesting laboratory technique new being used. This relates to the use of microorganisms for assay (or evaluation) of vitamins. For example, the rate of fermentation by the yeast *Saccharomyces cerevisae* is largely determined by the amount of vitamin B present in the medium. This fact is used to evaluate the amount of the vitamin present in an unknown sample by adding it to a medium of known energy substances minus the vitamin. The mould *Neurospora,* the bacillus *Lactobacillus* and the coccus *Streptococcus* have been used to assay biotin, pantothenic acid, riboflavin, niacin, folic acid etc.

3. **Industrial Microbiology** :

3.1. *The Industrial versatility of microbes* :

Long before the industrial uses of microorganisms were known they were mutely employed in production of fermented beverages, vinegar and leavening of bread with no knowledge of the science of it. The discoveries that led to the understanding of the biochemistry of microbial fermentations has stimulated a steady growth of microbe-based industries. The most famous and historical breakthrough in industrial fermentation was the discovery that the bacterium *Clostridium acetobutylicum* could be used for acetone-butanol production. Indeed, it was this development that turned the first world war as acetone was sorely needed for the manufacture of cordite by the Allies. The second world war saw the great beginnings of the antibiotic industry. With the experience gathered in the production of fumaric acid by microbial fermentations where the concept of neutral fermentations and a high degree of sterile conditions had been found essential, new bio-engineering problems were solved to maintain pure cultures of organisms on a large scale. These came in handy in mass culturing of antibiotic producing microorganisms.

3.2. *The antibiotic industry* :

One of the most spectacular fermentation projects undertaken this century was the commercialization of the first discovered wonder drug penicillin. There was as much science in it as there was technology. In fact, there is a great deal of research and development effort in the antibiotic industry even after three decades of developing the

penicillin industry. For instance, semi-synthetic penicillins like cloxacillin which can withstand stomach acids allowing oral administration have been successfully evolved. The triumphal global march of penicillin into therapeutic medicine has been followed by the tetracyclines. Like many antibiotics, the tetracyclines are toxic to the organisms that produce them. Although the bulk of the successful antibiotics have been derived from fungi or actinomycetes (and many of them are soil forms), there are others derived from bacteria such as subtilin and bacitracin which have their importance in therapy.

Antibiotics are now actively thought of in curative procedures in plant pathology also. Some of these are known to become rapidly systemic in plants, that is to say, when applied to the foliage or to the roots, the antibiotic molecules move into the entire plant and become available at sites where infecting plant pathogens start their parasitic phase. Streptomycin, terramycin, cyclohexamide and griseofulvin have been used for almost two decades. In Japan, blasticidin-S and kasugomycin have been in use for control of the rice blast fungus. Kasugomycin was isolated from *Streptomyces*. The remarkable thing about this antibiotic is its low toxicity to the rice plant or mammals and to fish. The Japanese do fish farming alongside rice cultivation in puddled condition and, therefore, low fish toxicity is as important as a curative approach to the blast disease of rice.

3.3. *Microbial fermentations* :

Many other fermentations are currently commercialized. Citric, fumaric, gluconic and lactic acids are a few worth mentioning. Lactic acid is produced by the bacterium *Lactobacillus* and is used in a variety of ways in the food industry and in the form of calcium lactate as a convenient means of getting calcium in the body. A variety of microorganisms are also used in providing a wide range of substances called amino acids which have diverse clinical uses such as post operative therapy, as supplements to low protein diets and as food flavourings. Amino acids can be prepared by chemical synthesis but this has the disadvantage of producing both optical isomers. Using biosynthetic production schedules, the L-isomer, which is the form found in most biological systems, could be selectively obtained. For instance, the common bacterium *Escherichia coli* could be used for producing aspartic acid, L-threonine, L-valine and L-phenylalanine by merely varying the methed of fermentation and the nutritional substrate of the fermenting organisms.

3.4. *Enzymes :*

Microorganisms that have the enzymic capacity to change certain groupings within the molecule are now employed to carry out a wide range of chemical changes in steroids. Steroids are compounds of great importance in the economy of the animal body as they are responsible for the regulation of carbohydrate and mineral metabolism. The rationale in using microorganisms in this critical area is to reduce the number of steps in lengthy chemical syntheses which stood in the way of commercializing steroid manufacture. Therefore, the main advantage in the microbiological method (using fungi) is that highly specific changes in the steroid molecule could be effected in a single step. There is little doubt that the transformation of steroid compounds by microorganisms is a process that will not be easily supplanted by chemical methods.

3.5. *Problems of pollution*:

I would now like to devote some time to one of the topical subjects of the day which concerns the whole of mankind. This is the disposal of sewage and evolving safe and sound anti-pollution methods in the major cities, particularly in the tropics.

Sewage consists of water containing organic, inorganic and suspended substances along with microorganisms. A typical domestic sewage would have nearly 25% fatty acids, about 18% carbohydrates, 10% fatty acid esters, 7% soluble acids and other substances in lower quantities. The main aim of purifying sewage is to reduce the biochemical oxygen demand so that if the effluent waters are run into, say, a river, the indigenous flora and fauna will not die from lack of oxygen. The chemical and biological changes that take place in activated sludge are not fully understood.* Organisms producing methane belong to several genera, the most important being *Methanobacterium*, *Methanobacillus* and *Methanosarcina*. They utilise a variety of substrates like alcohol, fatty acids, carbon dioxide and hydrogen to produce methane.

4. Industrial potential:

4.1. *Microbial strains*:

Industrial fermentation processes must be backed by continuous R & D on strain selection, both from natural sources, and from induced mutation by either mutagenic chemicals or radiation. It is quite obvious that alternative substitute organisms will have to be constantly developed to replace organisms normally used as fermentation agents.

The screening of new fermentation products is very important for possible other uses such as animal feeds or feed supplements. Many attempts are currently being made to use fungi as sources of food for other than the well known source of the edible mushroom. In India, in the Himachal Pradesh at Solan, the European cool temperature mushroom, *Agaricus bisporus* is now commercially grown and much R & D effort is going into the standardization of spawn culture, nutritive substrates, techniques of mass culturing under controlled conditions etc. This commendable effort could be taken note of and the ideal environmental conditions at Kodaikanal, Ootacamund, Coonoor and Yercaud could be exploited in this direction. Vast treasures of groups of microorganisms in the soil and marine environments await culturing, characterization and screening for their possible industrial potential.

On the fundamental side, the vast tropical arable and forest soils have many organisms whose precise role in nature is little understood. Microbial geneticists have been constantly endeavouring to transfer genetic materials in bacteria and produce new experimental races. There is also the possibility of using enzyme poisons and inhibitors of specific metabolic pathways so as to bring into play minor, but yet valuable, metabolic sequences from the industrial standpoint. Screening programmes of microorganisms with industrial potential is expensive business but there is no way out of this laborious time consuming exercise.

4.2. *R & D in microbial substrates*:

One of the critical areas in the fermentation industry is the search for cheap organic compounds as carbon sources for the fast multiplying microorganisms in culture. Carbohydrate sources for fermentation media are available in large quantities at fairly low prices in the tropics, and therefore, developing nations that have reached a fairly good technological level, should now enter into more diverse fields of microbe-based industries

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* During digestion of sludge methane is the by product

than hitherto. Many of the new hybrids in millets and maize could be tried and pilot experiments conducted on their importance in this area.

4.3. *Foods & Feeds* :

Algae and photosynthetic bacteria are good sources of protein and they are particularly attractive microbes because their photosynthetic capability practically does away with the need for organic substrates (as for instance, a source a carbon which most other organisms need for their metabolism). Much interest surrounds these organisms as they are non-residual in nature when ingested by the human stomach and are, therefore, an ideal energy source to astronauts. Interest also surrounds the fat-producing yeast Rhodootrula gracilis as this organism, in nitrogen starved situations, accumulates large amounts of lipids (fatty substances) within its cells. In recent years scientists have started taking interest in the microbial ecology of the rumen of the cow. The rumen is, in fact, an ideal fermentation vat where cellulose and other natural products are broken down by microorganisms by enzymic degradation into assimilable sources of carbon, protein and amino acids.

4.4. *Microbial Ecology* :

As already mentioned one of the biggest challenges in the heavily populated tropics is to enlarge our knowledge of the treatment and disposal of municipal and industrial wastes. A better understanding of the natural and changing pattern or microbial ecology taking place during the various stages of processing effluents is of paramount importance and in the present day awareness of the gigantic problems of pollution in soils and waters our efforts in this direction would seem timely and appropriate.

From small beginnings after World War I problems of biodeterioration of paper, fabrics, foodstuffs, wood, metals, concrete on land and in the sea have all become major areas of research in the advanced countries. Yet, in the developing countries, there has been little effort in this direction although the relevance of this problem in every walk of life in this part of the world can hardly be disputed. The deterioration of timbers, scaffolding poles, country fishing crafts, jute and coir products, cloth, tentage and the study of even the biodeterioration of the palmyra or coconut thatched roofing of the vast population of the urban and rural areas would constitute worthwhile research projects. It would seem futile arguing about what constitutes an industrial base; it need not be all electronics or heavy industries in my view. It could, indeed, be areas of human ingenuity and endeavour where problems are identified and applied biological research considered as worthwhile as researches in the development of nuclear energy or building a petroleum complex.

5. **Basic and Applied Microbiology** :

5.1. *Microbiological Institute geared to Industrial needs* :

In my view, there is a prima facie case for the establishing of an Institute for basic and applied researches in Microbiology with the widest terms of reference to tackle problems as distinctly apart as antibiotics and microbial sources of feed and feed to biodeterioration and problems of pollution. This institute would serve the nation as a clearing house for all problems of the industrialists and the common man and, indeed, act as a National and International Culture Collection of Microorganisms and Antisera, and initiate researches in general microbiology and virology. The more progressive States

could also organize their own Institutes of Microbiology and, depending on the types of entrepreneurs that are willing to come forward with ideas and the capital investment, problems of industrial microbiology could be studied at depth in these regional laboratories to great advantage.

5.2. *The Research Personnel*:

In biological research, and particularly in the field of microbiology, where the organism. whether an industrial microbe or a pest or one capable of adding to man's quest for alternative feed sources, it is the expertise that can be brought to bear on the subject that would pay dividends. It takes years to train a specialist in a group of microorganisms and, therefore, he should be supported and encouraged to specialize in that group, however narrow it may seem. This is so because it is this knowledge at depth that can inspire confidence in the minds of an industrialist, for, so much depends on the correct identity to the organism and any further improvement in its industrial performance by by mutational breeding would be closely woven with interdisciplinary researches in the fields of genetics, physiology and biochemistry. These lessons, learnt the hard way, by industrialists in the advanced countries have already permeated into our thinking as, indeed, in this country the biggest push in the field of industrial microbiology has been given rightly only to the antibiotic industry so far.

5.3. *Collective responsibility* ;

There are innumerable problems of fermentation that present many possibilities for the future and in these advances, in the understanding and practice of the industrial applications of microorganisms, universities, governments and industrial laboratories have joint responsibilities as purely theoretical discoveries of today can turn out to be of potential industrial significance tomorrow.

6. **The Sustaining Power** :

It is not for me to educate planners of our nation about the need for sustained efforts in the basic and applied aspects of the Biological Sciences. Some of the most outstanding leaders in the Physical Sciences in the Western World have been prophesying that the next fifty years would be an age of Biological Sciences. This has already come true: we have seen the birth of the new and dynamic science 'Molecular Biology' which has unravelled the mysteries of the genetic material resulting in the postulation of the genetic code. Therefore, technology alone will have no sustaining power on its own. It is the creativity of those in the basic sciences that would keep the wheels of industry moving. A nation like ours can ill afford to over-emphasise one aspect of our R & D effort; in fact, the balance lies in paying equal attention to the development of cultural aspects of our life, in philosophy, art, drama, music, linguistics and in basic and applied sciences. Our slogan should be 'Science *in* Technology' and not Science *and* Technology'. We cannot relegate to an inferior position any of these great disciplines.

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In the discussion of the paper at the Seminar in the Seminar Room at the Madras Institute of Development Studies on November 30th under the Chairmanship of Dr. Alladi Ramakrishnan, Director, Institute of Mathematical Science, Madras, the author restated the four basic propositions on which the paper is designed, namely, Parasitism and antibiotics ; soil fertility, food and feeds ; Industrial Microbiology; pollution; and then stressed the need for an organisational set up in the form of an Institute for further studies in the subject, mainly as Regional Laboratories.

Areas of scientific information with regard to the structure of fungi which were sources of various crop diseases and the use of antibiotics in preference to chemical fungicides were a point of particular interest. The Japanese experience in combining rice cultivation with piseiculture proved that the former were far safer to use than the chemicals. The main advantage of this composite farming is that the carbohydrates from rice is supplemented by protein foods from fish.

The antibiotic industry at Pimpiri and the unit at Rishikesh are producing penicillin and streptomycin. Indigenous research had also developed Hamacyin which is very useful for treatment of an obstinate infantile allergy. Another product is gricofulvin marketed by the I.C.I. However, indigenous manufacture of antibiotics has yet to be diversified and synthetic production of antibiotic is still uneconomic. R & D in this field was a categorical imperative as there is considerable secrecy involved in process and technology.

In this connection the inadequate attention paid to the natural sciences at the school and collegiate level was noted. In view of the fact that new discoveries in biological sciences were an index of the coming advances in this field, there was agreement that there should be a special effort made to create a base in terms of equipment and specialised trained scientific personnel in this Country. Problems of co-ordination of research effort between the National Laboratories and the Universities called for an approach which would encourage participation by University Departments of research in areas of special competence and the allocation of funds for the purpose. There is the Tamil Nadu Government scheme for inviting scientists and research scholars from abroad on an expenses paid basis, for specific projects. It was also felt that encouragement of local talents deserved greater attention.

An interesting query was raised about the possible bearing of microbiological studies in controlling population growth. The future role of microbiology in improving food supplies and living conditions was clearly brought out. An example cited was that cultivation of edible mushrooms, which has advanced in Himachal Pradesh where mushrooms are grown in trays on a commercial basis. The role of microbes in improving the nitrogen content of soils in India, which are generally poor in this respect, was also indicated.

Considerable improvements in institutional frame work were called for significant advancement in research in biological sciences. The principal suggestion in this context was the establishment of Regional Laboratories with specialised equipments and culture banks of strains of fungi and micro-organism. A very useful suggestion in this regard was provision for specialised training of science graduates in maintaining and servicing these equipments. A favourable factor mentioned was the suitability of the topical climate of India for developing substrates. Apart from the institutional improvements there was a need for a Forum to facilitate discussion of scientific matters and information flow. The recommendation of the State Planning Commission's Task Force for the Tamil Nadu Science Foundation with a separate department for the biological sciences could be used for developing an Institute of Microbiology in this State. Given the wide industrial, agricultural, health, food and environmental applications of microbiology for this State, there was general agreement that for the coming decade the Biological Sciences will be decisive. It could be for Tamil Nadu the Biological Decade.

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ENGINEERS AS INNOVATORS *

Research Engineers and Technologists

A recent study by the council of Scientific and Industrial Research[1] reveal that only six per cent of the degree level engineers and technologists are involved in research. The study further shows a highly uneven distribution of research engineers in terms of sectors and specialities—ninety per cent of them are working in the public sector and ten per cent in the private sector and 45.5 per cent in metallurgical, chemical and aeronautical fields with 4.5 per cent mechanical and electrical specialities. Further a higher percentage of technologists—twenty—are engaged in research. There may be here questions of definition as well as representatives of the sample. On definition, the key issue is the engineers who are engaged in research along with other activities, particularly in production and quality control. Unless this definition has been used broadly, there could be a certain degree of ad hoe-ness in the categorisation. The study is based on data relating to 21, 053 engineers and technologists which is not representative for some purposes such as specialisation but is representative enough for the purposes of this paper. The distribution between sectors represents a serious problem to which the attention will be drawn later. The distribution between specialites is, however, a function of the market demand for engineers and engineering researchers. There is a serious demand-supply disequilibrium in the case of mechanical and electrical engineers and a similar situation though quantitatively insignificant, among the researchers in these two speciatities. A 1972 survey of engineering unemployment in Tamil Nadu[2] shows that in a limited sample survey of 415 engineers who responded to an advertisement for unemployed engineers, 234 engineering graduates and five post-graduates were the ones who were unemployed. Of these 234 unemployed graduate engineers, 193 or 82 per cent were in mechanical and electrical engineering and of the five unemployed post-graduate engineers three were in those two specialities. A straight market demand analysis thus explains the skewed distribution of research engineers as between the broad specialities.

Invention and Innovation :

But what is disturbing is the small number of engineers — both in absolute and relative terms engaged in research — particularly in the private sector. The essential function of the research engineer is innovation and the less research engineers that we have in industry the less innovation will we have. Here the term innovation is used in the scientific sense, of bringing into being a new product or a new process — of " the process by which an invention or idea is translated into the economy." [3] As such it includes for

1. Technical Manpower : Bulletin of Division for Scientific and Technical Personnel—CSIR Vol XI, No. 12, New Delhi, December 1969.

2. A Study of the extent of unemployment among engineers; National Employment Service—Government of Tamil Nadu, Madras, September 1972.

3. Technological Innovation : The Environment and Management — U. S. Department of Commerce, Washington D. C., January 1967.

* Extracts from the paper submitted by Dr. Malcolm S. Adiseshiah to the Silver Jubilee Conference of the Indian Institute of Engineers, December 1972.

our Country a very wide spectrum from production of a known product like a boiler or stainless steel through an established technical process which we have not hitherto used in the Country, to work on a basic change in the technology of some available product such as bleached yarn or refractories, on to the application of an invention. We face a growing gap between our research activities and findings and our production growth. One way of closing this gap would be to transfer some of our resources from research to innovation, so that we may have a little less of research and a little more of industrial application of our research findings. At the moment we are living in two separate universes — the universe of research and the universe of production. Innumerable seminars, conferences, committees and commissions have been held on this tragic dichotomy in our economy. [4] What is suggested here is that the bridge connecting the two universes is innovation. And to build the bridge and use it, it is important to realise that any technological or production process involves three quite separate stages — invention, innovation and propagation of the innovation. The invention is the research result and is the cheapest part of the whole process of product innovation — around five to ten per cent of the total cost. The innovation part costs ninety to ninety-five per cent of the total, broken down into engineering and designing the product involving ten to twenty-five per cent of the cost, tooling and manufacturing engineering which is the most expensive part demanding forty to sixty per cent of the costs, manufacturing set up expenses involving five to fifteen per cent of the cost, and marketing set up expenses requiring ten to twenty-five per cent of the costs. Thus, the magnitude of expenditure on innovation is usually ten times as much as the costs of research. Innovation is costly — in men and money, but it is innovation which makes for production growth — not invention. And so, the engineers who are involved in research must be used as innovators, in the sense of assisting and engaging in the three-fold post-invention process detailed above.

Innovation in Engineering Intensive Industries :

And for this innovation emphasis, we need a very rapid increase in research engineers in our key industries. We are all aware of the poor performance of our iron and steel, petroleum, fertilizers, chemical, transportation and textile industries. (We talk of "sick" textile mills only because public resources have to be used to take over the losses sustained there, whereas we have similar losses in steel, petroleum and fertilizers, transport, which also should be termed "sick"). In the developed countries, petroleum and ferfilizer industries use some 170 scientists and engineers per 1,000 workers, chemicals over 100 engineers per 1,000 workers, transportation industries 70 per 1,000 ; steel 20 per 1,000 and so on. In fact, innovation demands an average of forty search engineers to 1,000 workers in all manufacturing industries in the developed countries. If we realise that we do not have even one-twentieth of this critical mass of research engineers in our equivalent industries, we can see why we have not even made a real start in innovation, and why our industries are performing so badly and can only be maintained within the four walls of the protected high cost structure characteristic of our economy.

Innovation in non-engineering intensive industries :

The manutacturing activity which requires the smallest proportion of research engineers is textiles – around five per 1,000 workers ; But this minimum is needed as the only way to prevent obsolescence in its equipment. In our textile industry we face two pro-

4. Report of the Committee on the Reorganisation of CSIR: New Delhi, July 1971.
Research and Industry : Report of the Committee, New Delhi, August 1971.

blems which are inter-related. One is the problem of obsolescence which is the major reason for the so called "sick mills". This obsolescence has been caused in part by the managements misusing the resources of the mills for personal ends, instead of replacing and modernising the machinery. But this modernisation is not simply buying new and replacing the obsolete machines. It is above all use of the necessary research engineering input in these mills that will ensure their modernisation. The other problem in the textile industry is the rate at which they are losing their export markets. To some extent this loss is due to the protective tariff and non-tariff barriers that the developed world has built to keep out our textiles. The Generalized System of Preferences proposed and accepted by the developed countries at UNCTAD II in Delhi still stand unredeemed at UNCTAD III in Santiago de Chile. But this breaking of the pledges by the developed world to facilitate the exports of India and other developing countries does not explain the substitution of Indian textiles in the U.K. market by textiles from Hongkong and Singapore and in the European Common Market and U.S. by textiles from Africa, Latin America and Taiwan. This loss of our textile export market to the textile industry in other Asian, Latin American and African countries is due to the poor quality and shoddy products and consequent consumer dissatisfaction with our textile output. No branch of industry, particularly those which are export-based, can afford to ignore the rapid changes in tastes and technology which are giving rise to corresponding changes in international market standards. The quality of our silks or the type of product like the ready-to-wear garments which were acceptable one year ago will not satisfy the world market this year. What is happening to our textile trade should be contrasted with the expanding exports of our finished leather goods trade on which we are just making a start. And that is because innovating technologists are at work in our beginning finished goods leather export trade, while they are badly in evidence in the textile field. The effort being made to unload its growingly obsolescent textiles on the captive domestic market is short-sighted and in part accounts for the alarmingly accumulating stocks in the handloom industry in this State, which is of the order of Rs. 11 crores. Nationalisation, the magic we turn to whenever we face a problem, is no answer because the nationalised mills face the same problem, except that they are modernising their machinery at the tax-payers' cost. What all these industries which have a low critical need of research engineers and technologists and which are performing badly as our paper, rubber, food and textile industries are doing, need is the assurance of this minimum engineering mass which can be engaged in the innovation process to keep their products growing and competitive.

Stages in Innovation :

Behind every new product coming on to the market, whether it be edible protein from crude oil or laser used in vacuum welding or the fertilizer produced from the city sewage and effluents, is a whole series of research and innovation resulting in the new types of machinery and processes. The innovation process involves as stated earlier

(a) Choice of product or process;
(b) engineering design;
(c) tooling and manufacturing;
(d) tests;
(e) start of manufacturing; and
(f) start of marketing.

While the research engineer and technologist is involved in this process, other essential work is engaged in simultaneously by the producer, in financing the operation, in market survey, in study of the legal aspects, in securing patents, advertising the new commodity, in building a maintenance network, etc.

Costs and Uncertainties in Innovation :

One of the problems in building innovation in our manufacturing industries is that investment in innovation is uncertain. This is the major reason why there is so little of innovation, particularly in the private sector and why only ten per cent of our research engineers and technologists are employed in that sector. The other reason is that with all our licensing rules and regulations, and limitations of capacity expansion and product diversification imposed by the Monopoly and Restrictive Trade Practices Act, the private entrepreneur is reluctant to invest in innovation and employ the minimum quantum of research technologists, because he is not sure that he will be allowed to use the new process or product. This institutional factor is however remediable and is slowly being righted. The major obstacle to our developing the process of innovation is the cost aspect and the uncertainty about the cash flows resulting from the capital and operating costs of the new plant and the State of the economy. But the prospective costs and benefits of innovation can be analysed and the argument that the uncertainties are such that it is best to rely on the businessman's intuition or hunches is reactionary and retrograde in production terms. Numerical calculations appropriate to the nature of each uncertain element can be worked out. If the operating costs of a new process, for example, is estimated as there being an eighty per cent chance that it will be Rs. 200/- per unit, and that there is a ninety per cent chance that it will sell at Rs. 250/- per unit, the confidence level of the estimate, that the surplus of benefit over cost, will be Rs. 50/- per unit is then the product of the confidence level of the two events, namely, 0.72. This is not to say that the cost-benefit analysis of innovation will make all uncertainties disappear. It is to say that we have the know-how to formulate the costs and benefits of innovation with reduced risks of going astray. Further in the process of innovation, the unknowns and therefore the degree of uncertainty are reduced. And though we talk of monopolies in our country, the size of our biggest firms is really so small in international comparative terms, that they can engage only in modest advances in technology and the margin of error in the estimates for such modest advances is negligible compared to those for the more ambitious projects who do not exist on our industrial map.

Innovation in the Private Sector :

Every firm's objective in our Country, whether in the public or private sector, is profit maximisation or mass production of some product essential for our poverty sector or, as in most cases, a mixture of both. Whatever the firm's objective, the methodology for attaining it should be not just proliferating new projects nor merely expanding capacity of the existing process, but development of new or improved products and processes within the firm's line of production. That is, profitable innovation and the conditions for its success are three-fold : that policy decisions are made to make investment in innovation ; the decisions are continuously made and reviewed about the rate of growth and the direction of growth in the firm ; and that there is the capacity to find opportunities to innovate. That capacity is the research and development department which should exist in every firm, staffed by research scientists and engineers. On this capacity issue, there are serious lacunae that must be faced by our manufacturing units. The first is what has been referred to earlier, namely, that our private undertakings do not have the capacity and must build R & D departments. In 1958–59, of 18,000 research scientists and engineers engaged in R & D, only 200 were in the private sector. In 1968-69 out of 62,349 such researchers in the Country's R & D, a mere 2,333 were employed by the

private sector.[5] In the electrical equipment and communication industries, the international norm is that 8.5 per cent of the net sales of a producing unit should be spent on R & D. Our industries in this area do not allocate even one per cent of their net sales in employing research engineers. Even in ferrous metals where the norm is at 0.7 per cent, our largest private producer, TISCO, allocates about a third of that norm, 0.25 for R & D.[6] The conclusion is clear. If our industries are to build innovation in their production programme, they must attract and employ research scientists, engineers and technologists at around ten times the present rate.

Innovaton and the Total Production Process :

The second problem is that the R & D department in a firm must not be a segregated ghetto. The research engineers must not be put into a department and cut off from the whole life of the firm. Innovation is not a function that can be cleanly cut off and produced in an R & D department or in a national laboratory, as we have learned to our cost from our experience in the CSIR and other national laboratories. Of the 62,349 research scientists and engineers in 1969 referred to earlier, nearly half, 29,845, are so employed in such segregated national laboratories[7] It was, perhaps, necessary to start with such separation in order to promote R & D in the country. It is good that CSIR is now engaged in breaking down this segregation from industry. Our manufacturers must now come forward and incorporate the national laboratories in their production programmes and processes. The same cross-fertilization between research engineers and scientists and those engaged in production, cost accounting and marketing must be established in each of our firms, if the research staff is not to think up new products that will not sell, or new processes that cannot be operated economically, or projects that require capital that is beyond the borrowing capacity of the firm. The recent seminar on marketing in public sector firms emphasised the need for constant interchange between engineering and marketing personnel. It referred to the need for an integrated approach at all levels of decision making.[8] Innovation is an untidy set of activities that cuts across departmental boundaries and this characteristic untidiness of innovation must never be forgotten.

Our Comparative Advantage in Innovation :

Such innovation - prone industries in our Country have a comparative international advantage. Our engineering firms in railways, boilers, transformers, electrical equipment have been able to bid successfully in Malaysia, Indonesia, Kenya, Iraq, Ceylon, Yugoslavia, in competition with the engineering firms of the developed world. This success of our engineering industries has been due to two factors. First, it is because our engineering costs are low, as compared to Europe, Japan and North America. Our lower

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5. Report on Science and Technology : Committee on Science and Technology, Cabinet Secretariat, New Delhi, 1969.

6. National Difference in Styles of Research Management; H. Gershinowitz; in Research Management, New York, 1969.

7. *Opp* : *Cit :* Vide foot-note 5.

8. Report—Seminar on Marketing in Public Sector Industries : Government of India, New Delhi; October 1972.

R & D costs have even led some multi-national corporations like Hindustan Lever and CIBA to locate their R & D units in India. A second equally important reason is the quality of our process and product. It should never be forgotten that lower comparative costs are essentially a function of quality innovation production. The reason why our engineering units are not internationally competitive over a wider range of equipment and products is because their production processes are not under continuing improvement and upgrading. Another area where we have an international comparative advantage is in the high technology labour intensive electronics field, provided we build and maintain in it an appropriate innovation element, including the engineering and other staff to ensure the transition from development to application. In these industries, there is a need for a clear policy on innovation. [9]

The Moral :

The moral of this discussion is that there is need for both the public and private sectors, particularly the latter, to increase the resources allocated to innovation ; that there is need for a rather large scale increase in the number of our research engineers and technologists who are the innovators ; that our engineering and technology training institutions should develop pilot courses in innovation and they and the CSIR and other national laboratories should increasingly act as innovation, not research, consultants to industry ; and that the public and private sectors must rapidly equip themselves with at least the minimum critical mass of research engineers and technologists who are the instruments of that break through from our current industrial stagnation which the Country demands for its fight against mass poverty.

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9. R & D in India's Industrial Future : W. Moorhouse in Economic and Political Weekly. Vol V. No. 4, Bombay, 1970.

PUBLIC SECTOR MANAGEMENT PROBLEMS IN INDIA

By

DR. JOSEPH POIS

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A special meeting of the Seminar on Wednesday, November 15, presided over by Mr. R. Venkataraman, held in the Seminar room of the Institute, was devoted to the subject : Problems of Public Sector Management in India. On this occasion the President and the members first outlined the problems on the basis of which, Dr. Joseph Pois, the Ford Foundation consultant, made his statement.

Losses of Public Sector :

The Public Sector, its role and problems, should be first established. In developing countries like India where private savings are inadequate to ensure growth, the public sector is essentially a growth generating tool. This tool is used in India to attain certain economic objectives such as the production of industrial raw materials, the provision of infrastructure etc. as well as the attainment of certain social objectives like the prevention of monopolies, inequalities of income, etc. But the use of public sector to attain social objectives is questionable as they can more quickly and effectively be obtained by taxation and legislation. The statistical evidence of our public sector problems can be seen very simply. We have invested Rs. 3800 crores in this sector and on the basis of a 10 per cent return, we should be obtaining Rs. 380 crores. Actually in 1969-70 the sector as a whole suffered a loss of Rs. 3.2 crores. 41 units registered a profit of Rs. 71 crores and 26 units registered a loss of Rs. 74 crores. The capital cost of our heavy industry is on the average 50 per cent higher than in other countries because of the tied aid we receive and the very long gestation period. There is also the problem of the public sector units not buying from each other.

Large vrs. Medium Industries :

Our record shows that medium scale public industries like Indian Telephones, Hindustan Teleprinters and Bharat Electronics are efficiently managed and make profits, while all our heavy industries, Hindustan Steel, Heavy Electricals, Heavy Engineering and MAMC make losses. Even in regard to the medium industries in electronics allowance must be made for their operating in a captive market. They seem to have no pricing policy and their lack of accountablity is serious. Again while Bharat Electronics is run efficiently why is Indian Telephones in the sick category ? Public enterprises seem to close the doors to private firms. Equally in the competition between public enterprises, they give preference to private units rather than to one another.

Public Sector Achievements :

The public sector undertakings have important achievements to their credit. They have produced basic materials like steel and saved foreign exchange, they have helped in

developing townships and the infrastructure to development. The problems of management are common to both the private and the public sector, only we tend to forget the losses of the latter. The textile industry has developed under a very heavy protective tariff for which the consumers have had to pay and through mismanagement they are sick today. It is important to develop a proper kind of calculus in measuring the pay off of the public sector. The losses of the public sector are the gains of the private sector. There are also problems of a mixed economy where the private sector contributes to the loss of the public sector. There is the overstaffing of labour in both public and private sectors which is natural in an economy where there is a plethora of labour.

The Management Imperative :

In an economy where there is low level of savings, the question that must constantly be asked is: who will perform better in any given line of production—the public or the private sector? What is necessary is to establish a very clear distinction between the areas of the private and public sectors. On the other hand in our country there is an irreversible trend towards the public sector. We have no choice in light of our national goals except to move in the direction of more public goals, except to move in the direction of more public ownership, management and control. Under these conditions, the managerial problems become extremely critical. Reliance should not be placed on the civil service for public sector management. In the private sector not even one per cent of the managers are trained and in the public sector it is even less. A management and manpower policy are urgently needed which will define what types and levels of management we need. The existing management institutions cannot meet our quantitative needs which are for over 10,000 managers a year. They are all-purpose institutes whereas we need specialised institutions for various types and levels of managers. We also need a recruitment procedure for top level managers and specialists at lower levels. The five-year rule should be enforced to ensure job satisfaction in management. At present there are no rewards for good performance and no penalties for bad performance. There should be performance evaluation.

Government interference in private enterprises is a negative factor against which it is hoped that conventions will be developed. It is clear that the public sector should not enter the trade and small scale areas but should limit itself to power, large industry and infra-structure, for each of which an optimum size should be established. There is a case rapid improvement of management in both the public and private sectors. One of our problems is that we mix our ideologies and so do not have a precise frame of operation.

The U. S. Management Experience :

Dr. Pois in his statement took into consideration the complex of problems outlined above : In the United States, the line of demarkation between private and public sectors is becoming blurred. The U. S. is not a private sector economy any more. The government has a major role in directing and subsidising production. There is increasing recognition of societal obligations in environmental health, the objective of full employment etc. Beneath the facade of the private sector we have a major governmental activity in U. S. Hence the basic issues are the same for the two countries. India's concern about the public sector is matched by the U. S. concern over government intervention.

The principle of autonomy of a public enterprise and its accountability is accepted. But private enterprise must also have the same public accountability and in that sense it is common to both the private and public sectors. But accountability is a complex factor. In examining a public enterprise its present performance as well as its future potential must be taken into account and for this sophisticated forms should be used. In the U.S. private sector, the corporate analysts have developed a very advanced art of investigating very carefully a private enterprise. This is the discipline lacking in public undertakings for which performance evaluation is essential.

The U.S. experience in management may also be pertinent to India. How are information systems and sophisticated management techniques to be developed? Even more difficult is the problem of learning how to use them. So often the facade of modern managerial skill can be both misleading and frustrating. The computer and the punch card must be understood if they are to be a management tool. Very often they mislead. If younger people are trained in modern management techniques and there is no climate for their use in public sector, the young managers will only be frustrated. In both public and private sectors, the same manager is not needed for the entire life of the firm. At one stage promoting qualities will be needed, at another stage innovating qualities and at a further stage a perspective capability.

The distinction between a public enterprise and the government is a sound one. But the distinction should not be carried to the point where the public sector is deprived of the infrastructural facilities which the government provides. In that sense there can be no complete autonomy for the public enterprise and there is as much need for improving government establishment and management as for improved management of the public enterprise.

The size of a firm itself generates problems both in the private and the public sector. The ITT in the U.S. is a mammoth firm but well managed. On the other hand, U. S. railroads which is a private sector undertaking is the most mismanaged. So virtues are never all on one side and vices on the other. In setting up new enterprises there is need for ensuring economy, efficiency and development. Here an enterprise in any sector can be bureaucratic and resistant to change and flexibilty. The surrender of controls is no solution. What we must have is an inventory of managerial needs and a programme to meet those needs.

The way forward for public sector undertakings:

The president summing up the discussions and statements pointed to four problems in public sector management: (1) lack of technical ability and management, (2) underutilization (3) labour surplus and unrest and (4) lack of competition. The two tests of effective management are producing up to the rated capacity and the price being competitive, there is no answer except mismanagement for producing below capacity. Price comparison is difficult because of the distortion introduced by excise duties. However a standard price test can be applied. Only 22 public sector units satisfied these two tests whereas 45 units failed the tests. The moral for the future is that we should start public enterprises on a medium scale, build up the infrastructure and the managerial talent at

which point, we could move to the large scale. We have started at the wrong end by establishing and continuing to plan for large scale units. Our power crisis to-day is due to our not using our existing capacity for 110 MW sets but waiting for 200 and 500 MW sets. Meanwhile we face the grave power crisis. In developing countries, the economies of scale of large units do not operate because when the unit is enlarged, the infrastructure and the ancillaries must be enlarged and the managerial talent bottle-neck faced. Our optimal size as we learn from Tamil Nadu experience is the medium size from which we should start to build our public sector undertakings.

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DRAFT PERSPECTIVE PLAN FRAME FOR TAMIL NADU 1972—1984.

INTRODUCTION

The Draft Perspective Plan Frame gives the objectives and a tentative outline of the strategy, the growth rate and the financial outlays required to achieve the objectives. This draft is offered as basis for State-wide discussion to enable the Planning Commission to draw up by the summer of 1973, the State's comprehensive Perspective Plan for 1972—1984.

The details of this Report are arranged under five main sections as follows :

I. Objectives and Strategy ;

II. Decentralised Planning ;

III. Basis of Plan Projections ;

IV. Sectoral profiles ; and

V. Financial implications.

SECTION I

1.0. *Objectives and Strategy—*

The main objectives of the Perspective Plan are:

(i) Doubling the per capita real income by 1984 ;

(ii) Efforts to provide Full Employment by stretching administrative, institutional and financial efforts to the maximum ;

(iii) Attacking in a selective manner the worst forms of poverty through implementing the Minimum Needs Programme ;

(iv) Bringing about social justice by reducing economic and social inequalities;

(v) Accelerating the process of social change necessary for economic growth by transforming the social structure and social attitudes ;

(vi) Promoting cultural activities and community participation in them as a means of Humanising Economic Development Programmes ; and

(vii) Decentralising Planning, development and resource mobilisation.

The implications of these objectives are indicated below :—

1.1. *Doubling the per capita real income—*

The aggregate income of Tamil Nadu increased from Rs. 1,935.76 crores in 1960-61 to Rs. 2,686.66 crores in 1970-71 at 1970-71 prices, while the per capita income moved up in the same period from Rs. 574 to Rs. 654 (expressed at 1970-71 prices) These figures give a compound growth rate of 3.5 per cent per year for aggregate

income and 1.5. per cent for income per head. At this rate of growth, the State income would rise from Rs. 2,686.66 crores in 1970-71 to Rs. 4,201.94 crores by 1983-84 (at 1970-71 prices). But since the population of Tamil Nadu is expected to rise from 41.1 million in 1971 to 53.69 million in 1984, the per capita income will have risen only to Rs. 783 at 1970-71 prices. But the Perspective Plan aims at doubling the per capita real income of Rs. 654 in 1970-71 (at 1970-71 prices) to Rs. 1,308 in 1983-84 prices). Therefore, the State income should rise to Rs. 7,023.96 crores in 1983-84 (at 1970-71 prices) at a compound growth rate of 7.6 per cent per annum, if we are to achieve the objective of doubling per capita real income.

The reason for reckoning the increase in terms of real income is to ensure that there is a doubling of the bundle of goods and services. In this way the play of the inflationary forces is taken care of. Actually in money terms, the income might have to be more than double of what it was in 1970–71.

The Draft Frame is not obsessed with a mere growth of Gross National Product. It seeks to integrate production goals and distribution policies, to place Employment as a central objective and to define minimum consumption standards that should be attained.

Doubling the per capita real income in the course of 10 to 12 years may be considered by some as excessively ambitious, especially seeing that in the last 20 years of Planning the *real* per capita income of All-India has risen only by 30.6 per cent; but, precisely because of this slow rate of growth, the Plan Frame has adopted a new plan strategy which combines production and distribution functions with employment as the central aim. By adopting this strategy, quite a few countries have succeeded in trebling and even quadrupling their real income in a period of 20 years. Even such doubling will mean only a monthly income per person of Rs. 109 in 1970-71 prices.

All calculations in this Draft are based on 1970-71 prices unless otherwise specifically mentioned.

1.2. *Provision of Full Employment—*

The task of tackling the mounting unemployment problem is rendered difficult by the absence of reliable statistics.

The number of unemployed persons in India at the end of sixties has been estimated at 14 million or 2.5 per cent of the total population. Proportionately, the number of unemployed in the State work out to approximately 1.1 million.

On the basis of another approach, the total number available for employment in 1971 would be 16.4 million for a population of 41.10 million, i.e., for 8.22 million households, if we assume that 2 persons in each household were earners. However, the actual workers according to 1971 census was 15.1 million. It will follow that the remaining 1.3 million are unemployed. This is close to the estimate on the All-India basis indicated above.

On the assumption that unemployment in Tamil Nadu in 1971 was 1.2 million, the position at the commencement of the Fifth Five Year Plan can be projected by taking into account the addition to labour force each year. The addition to the labour

force between 1971 and 1974 will be of the order of 0.9 million. If 50 per cent of this addition is absorbed in the normal course of expansion in economic activity, the balance of 0.45 million will swell the ranks of unemployed, increasing the backlog to 1.65 million (1.2 + 0.45) at the commencement of the Fifth Five Year Plan. Similarly, the addition to the labour force will be 1.9 million at the commencement of the sixth plan.

Faced with this backlog of 1.65 million unemployed, at the commencement of the V Plan and the regular additions to it every year, it should be the endeavour to eradicate unemployment completely in the course of 12 years. This would be possible only if the rate of generation of employment is higher than the rate of growth of the work-force. The Plan has, therefore, selected an investment-pattern calculated to make the programmes labour-intensive, in agriculture, animal husbandry, fisheries and small industries.

Special steps will be taken to mitigate seasonal unemployment which is characteristic of all agrarian economies. Both from the standpoint of educational reforms and the pattern of investment for economic development efforts will be made to solve the problem of educated unemployed. The problem of educated unemployed will be given special attention and schemes to tackle this in a selective manner will be indicated in the Perspective Plan. Provision of special facilities to help entrepreneurs, agro-service centres, intensive pre-school schemes and social education schemes, adult literacy and out-of-school education schemes are instances in point.

1.3 *Attacking in a selective manner the worst forms of poverty*—

Sixty per cent of the people of Tamil Nadu are estimated to be living at or below 'poverty line'. Their daily food consumption ranges from 1,000 to 1,300 calories; the sixty per cent illiterates and school drop-outs are identical with this group; they live in urban slums or rural huts with little access to health or hygienic facilities. It is proposed to make a selective attack on the worst forms of poverty by progressive reduction and eventual elimination of malnutrition, disease, illiteracy and squalor, through the implementation of the Minimum Needs Programme. In order to achieve this, people belonging to this group have to be provided with a minimum intake of 2,200 calories, basic school and out-of-school education, health and housing facilities and protected water-supply. Special protective foods to ensure adequate protein nutrition, will be provided for this poor majority, which includes the vulnerable groups of the pre-school child and the pregnant and nursing mothers. The beggar problem will be eradicated by concerted socio-economic measures of rehabilitation and education, with the co-operation of the public and the social workers.

1.4 *Ensuring Social Justice*—

Further land legislation covering tenancy records and rights, Kudiyiruppu, distribution of lands to the landless labourers, rigorous enforcement of ceiling legislation and gradual elimination of absentee-land-owners will be undertaken. The small farmer will be helped to earn a living income. In urban areas, urban property regulations will be enacted and enforced. A minimum living wage in the State will be enforced and social security measures including old age pension scheme for small farmers, and agricultural labourers will be initiated.

Gaping economic inequalities are not only inter-personal but also inter-sectoral. Among the sectors, the primary sector has the lowest per capita income. Also, within this sector, there is wide disparity in the incomes of big, medium and small farmers, tenants and the agricultural labourers, and those who depend solely on animal husbandry and fishing. Similarly, in the secondary sector, the earnings of workers vary in large scale, medium, small-scale, cottage and village industries and also among units in the same industry. Even now variations are noticed in the earnings of those engaged in the tertiary sector including the small traders. The average per capita income in the three sectors varies from Rs. 428 in the primary sector to Rs. 933 in the secondary sector and Rs. 1,117 in the tertiary sector in 1970-71 (at 1970-71 prices).

The Perspective Plan aims at narrowing down these differences to levels of tolerance. Social justice demands reduction of imbalances, not only as between regions, but also as between communities and classes.

1.5. *Social change, Development and Welfare of Backward Classes*—

To achieve this aim, voluntary organisations like the Prosperity Brigade, Youth Corps, the Guild of Service and other similar agencies will be used to eradicate caste and communal factors which hamper growth and act against the dignity and worth of the individual. All social and economic factors which promote hierarchical arrangements in society will be investigated, and legislative and voluntary action taken to correct them. Closely bound up with this problem are the sociological factors that stand in the way of fuller participation of certain backward classes and areas in the exciting exercise of economic progress. The transformation of the social structure and reshaping of social attitudes towards modernity is a challenging task intimately tied up with economic growth.

Planned development is contemplated with particular emphasis on the condition of backward classes, scheduled castes and scheduled tribes. Special programmes will be executed and policy measures steadfastly pursued to bring about rapid economic and social improvement of these classes.

1.6. *Promoting cultural activities and community participation*—

Tamil music, drama, literature, poetry and the fine arts, films, folk dances, folk lore will be promoted, so that people in the rural areas can participate in their community culture fully. To this end, cultural centres, theatre groups, libraries, music festivals and poetry competition will be organised in the Blocks and in Taluk headquarters. These activities will be useful in enthusing the people towards direct participation in the economic growth programmes and in decentralising the planning and execution at the level of local authorities to a larger extent.

1.7. *Decentralised Planning, Development and Resource Mobilisation*—

To make planning more effective and to achieve higher growth rates, it is necessary to decentralise planning, development and resource mobilisation. By this, a Plan ethos can be evoked and participation of the people at large can be enlisted in the arduous task of development. When planning for the development of smaller areas like the district, a beginning can be made with the reformation of autonomous boards or councils which can be made responsible for looking after primary and secondary education, development of

roads and rural water supply. They may also be helped to realise cesses and taxes which have local significance, and provided with opportunities for raising substantial revenues through the implementation of self-financing schemes such as development of land in urban areas.

1.8. *The Strategy*—

To attain these objectives, the strategy will consist of investment on a massive scale in sectors and programmes which will give a high growth response to the application of Science and Technology, and will result in maximum employment opportunities. Identification of growth centres, regional planning and enlisting people's active participation in the planning process are the other planks in the strategy.

In Agriculture, this will imply the increased application of Science and Technology to farming, ***inter alia,*** extension of the benefits of the Green Revolution to dry farming, changes in cropping pattern, varietal improvements in seeds, increased use of fertilisers and pesticides, better water management, exploitation of ground water resources and utilisation of interstate waters by suitable schemes.

In Animal Husbandry, this will consist of the substitution on a large scale of nondescript cattle by pedigree animals, expansion of feed and fodder production, dairying, intensive poultry development, sheep-rearing, piggery, etc.

In Fisheries, this will comprise introduction of large-sized mechanised boats and trawlers, development of deep-sea fishing, better marketing and refrigerated storage facilities, development of fishing harbours, etc. In inland fisheries, integrated fish seed production and distribution schemes, reservoir-fisheries development, reclamation of swamps and tanks for taking up fish-culture will be intensified. Measures suggested for the social uplift of the fishermen include the formulation of a comprehensive Life Insurance Scheme, a feasibility study on the scope of establishing different cottage and subsidiary industries in fishing hamlets, stressing the need for recruitment of the fishermen into the Navy in view of their sea-faring qualities.

In Industry, the Plan relies heavily on the improvement of management and manpower techniques, so that the existing industries may work to full capacity. Fresh investments will be in sophisticated industries which have a high growth rate in key industries, like chemical complexes and the Salem Steel Plant which have an acceleration effect, in the complementary, ancillary and subsidiary small industries which possess a high employment potential, as also in agro-industries on an extensive scale. The Handloom Industry which is an important employment-oriented decentralised sector will be developed and stabilised by provision of necessary production and marketing facilities. This sector deserves special attention in view of the employment it generates and its decentralised character of the industry by its very nature. Introduction of power looms will also be given due importance to modernise the industry and make it competitive.

In Power development, Tamil Nadu would have achieved a major break through by completing rural electrification by 1973. The solution to increasing demand for power lies in the constitution of a regional grid with the fuller exploitation of inter-state rivers by suitable administrative arrangements among the concerned States.

In the tertiary sector, rail links are to be provided to Districts like Kanyakumari, hitherto unserved by railways. Also, an extensive system of road communications is to be provided to all villages, connecting them to nearest marketing centres. The development of ports, inland water ways and the Sethusamudram Project are also to be taken up.

In Social Services, the strategy would be public distribution of essential goods (food, cloth, kerosene, etc.) for mass consumption at fair prices for those below the 'Poverty line'; to undertake massive rural and urban housing and slum improvement and clearance programmes; provision of education up to 15 years to all children both by in-school and out-of-school arrangements, a comprehensive adult literacy programme; continuing education to all those who desire it, introduction of vocationalised, employment-oriented secondary and higer education, to intensify health and nutrition in Family Planning programmes for the whole State and to ensure the provision of protected drinking water to all and to expand and improve hygienic and sanitary facilities to them; and to achieve all these improving the efficiency in public sector undertakings and Government departments.

SECTION II

2.0. *Decentralised Planning*—

2.1. *District Plans*: Decentralised Planning, we hold, is a powerful weapon for attacking mass poverty in the State. The particular problems that each group and area faces can be assessed and solutions can be found on the basis of local mobilisation of resources, human and material. Target Planning and Central and State indicative programming must be supplemented and supported by planning from below. These considerations have led to the decision that the unit of Planning will be the Development District. Each Development District will have a Plan of its own, as an integral part of the State Plan.

The State's 23 Development Districts are each formulating a District Perspective Plan for the 12 year period 1972-73 to 1983-84. The District Plan is to be based on the resources and socio-economic factors at the Block level.

Each District has divided its planning area into a number of homogeneous sub-regions. For each sub-region an integrated Programme of projects is presented in :—

(a) Agriculture, Animal Husbandry, Forestry and Fisheries;
(b) Small and Cottage industries;
(c) Water-supply, Housing and Sanitation; and
(d) Education, Health and Nutrition and Cultural Promotion.

But there will be no uniformity in the District Plans. The only common feature will be that each District Plan will aim at full utilisation of resources—human and material—of each homogeneous sub-regions overcoming its constraints and providing for its backward sub-regions and communities the minimum food, health, education, housing, drinking water and employment as a priority. But each sub-region will have its own priority. This would imply two things :— One, providing the Panchayat Union with new and expanding sources of finance, and two, decentralisation not only in formulation, but also in execution of programmes involving considerable changes in the existing pattern, procedures and structure of Block Development Plan administration.

SECTION III.

3.0. *Basis of the Plan Projections.*—

If the target of doubling of per capita real income at the end of Sixth Plan period, i.e., 1983-84 is to be achieved, it is necessary to step up appreciably the rate of investment—sectoral and overall, in the course of the next twelve years. The magnitude of investment required and the phasing of the investments over the plan period has been arrived at by projecting the economy into the years up to 1983-84. This Projection is based on the following two fundamental assumptions :

3.1. *One* : *On the basis of population growth*—

The population of Tamil Nadu in 1970-71 is estimated at 41.1 million. Taking into account the present birth rate which is lower than the rate for India as a whole (35 per 1000 against 42 per 1000). The impact of the family planning programmes which would result in a decline in the general fertility rate, and the mortality and migration trends, the future population of the State is estimated as follows :—

Year.	*Population in Million.*	*Year.*	*Population in Million.*
1971	41·1	1979	48·9
1974	44·0	1984	53 7

3.2. *Two* : *On the basis of the incremental capital output ratio*—

According to Government of India Plan documents, the incremental capital output ratio is taken to be 2.0 for the periods of the Fourth Plan and 2.4 for the subsequent periods. On various considerations, such as the historical experience in the State and the projected investment pattern of the Perspective Plan, an average incremental capital output ratio of 2.3 for the period of the State's Perspective Plan (12 years) is assumed. It would then follow that to produce an increment in State Income of Rs. 4,197·75 crores (Rs. 7,023.96* crores minus Rs. 2,826·21† crores) required for doubling the per capita income, an outlay of Rs. 9,655 crores in 1970-71 prices will be required. By deducting Rs. 347 crores which would be the likely investment in the last two years of the State's Fourth Plan, there will be a balance of about Rs. 9,300 crores to be invested in the Fifth and Sixth Plans. Of this, the State outlay will be about Rs. 3,900 crores. The details of the allocation of this outlay as between the Fifth and Sixth Plans and between Central and State Sectors, the Private and Co-operative Sectors are given elsewhere (*vide* Section V on Financial Implications).

3.3. *Structural change in the Economy*—

As the development proceeds, the economy undergoes a structural change, that is to say, the relative contribution of the different sectors to the total income of the economy tends to vary. This is normally implied in economic development but when there is planning for development, this change is deliberately brought about. In 1970-71,

* Projected income in 1983-84 at 70-71 prices.

† Projected income in 1971-72 at 70-71 prices.

agriculture and allied activities contributed 42 per cent and mining and manufacturing 22 per cent while commerce, transport and communications together, and other services accounted for 17 per cent and 19 per cent respectively. In the context of economic development it is reasonable to envisage a relative decline in the contribution of agriculture and a relative increase in the share of manufacture and transport and communications. This process, however, can be expected to be gradual unless inducements are offered to expedite it.

In 1970-71, the Primary Sector with 63 per cent of the population gets only 42 per cent of the income. In the other sectors the share of the income is greater than the share of the population. It is particularly marked in Commerce, Transport and Communications. This sector with 6.6 per cent of the population was getting 17 per cent of the income.

3.4 *Per capita income and Sectoral Shifts*—

If the sectoral distribution of population in 1971 and 1984 are assumed to be constant, and their per capita real income doubled, then the progress among the sectors will be, the per capita income in the Agriculture Sector will have increased from Rs. 428 to Rs. 785; in the Mining and Manufacturing Sector from Rs. 933 to Rs. 2,313; and in Commerce, Transport and Communications from Rs. 1,865 to Rs. 3,369 between the years 1971-1984. Even so, the per capita income in the Primary Sector is very low due to the heavy pressure of population in that sector. The Plan therefore envisages a shift in the sectoral distribution of income and population.

It is assumed that out of the surplus arising from natural growth of the population in the primary sector, 20 per cent may be absorbed in the Mining and Manufacturing Sector, 10 per cent in the Commerce, Transport and Communications and 10 per cent in the other services, while 60 per cent will continue to be in the Primary Sector.

Even after such a shift both in population and in income, the per capita income in 1983-84 in the Primary Sector would be only Rs. 864 at 1970-71 prices.

SECTION IV

4.0. *Sectoral Profiles*—

It is premature at this stage to spell out the various schemes that are to constitute Perspective Plan, their size and order of priority. Fifteen Task Forces and 13 District Planning Cells are engaged in this work. However, a tentative list of 'Candidate' Schemes which deserve consideration for inclusion in the Perspective Plan period together with order of investment required is indicated below. Their final choice, however, will, among other things, depend on the magnitude of the Sectoral allocation to be decided upon in the light of total plan outlay.

4.1 *Agriculture and Allied Activities*—

4.1.1. *Agriculture*.— The agricultural production programmes are oriented towards providing balanced diet to the population and supply of raw material to the agro-based industries. Programmes for the extension of the area under high-yielding varieties and

for stepping up the production of the protective foods like pulses, vegetable oils, fruits and vegetables, extension of the Intensive Agricultural Development Programme to all other districts, except Madras, are envisaged. Extension of Intensive Cotton Development Programme to the entire State, intensive development of sugarcane cultivation and oil seeds through area development projects are programmed. Schemes for the supply of improved seeds and ensuring supply of quality fertilisers and plant protection chemicals and intensification of research are also envisaged.

4.1.2. *Irrigation and Soil Conservation.*—Important programmes are to be taken up in the sphere of water management such as lining up of channels and tank improvements, exploitation of ground water sources, drainage scheme etc.

4.1.3. *Animal Husbandry, Dairying and Milk Supply.*— Establishment of new animal farms, intensive cattle development projects, fodder production including sewage farm, importing of exotic animals, piggery, sheep and poultry development, expansion of the existing and opening of new veterinary instiutions, milk colonies, milk products, etc., are contemplated.

4.1.4. *Forests.*— Development of forests would include plantation of trees of industrial and commercial value and substantial expansion of rubber, tea, coffee, cinchona, and cashew plantations. A sandal oil factory is also proposed to be set up.

4.1.5. *Fisheries.*—The strategy mentioned in paragraph 1.8 will be adopted to achieve the objective.

4.1.6. *Co-operation and Community Development.*— The lines of development indicated under this head are : Extension of existing programmes and introduction of new schemes relating to educational tours for women, baby shows, and social education and training camps, bee-keeping, soap-making and mat-weaving, construction of community halls, radio-room, distribution of new radio sets, and extension of protected Water-supply in rural areas and construction of additional link roads and improvements to the existing link roads.

4.2. *Industry and Mining*—

4.2.1 *Large and Medium Industries.*— The important projects and developments envisaged are : the Salem Steel Plant, an Ammonium Chloride Plant, a Refinery Unit, a Soda Ash Plant, a Naphtha Cracker Plant ; the S.P.I.C. at Tuticorin, expansion of the Arkonam Concast Plant and the Alangulam Cement Plant, a tyre manufacturing Plant, and ancillary units to Salem Steel Plant and Manali Petro-chemical complex. Besides these, units for the manufacture of cement, paper, synthetic fibre, aluminium, automobiles, auto-ancillaries and sugar are contemplated. Modernisation of textile mills, setting up of powerlooms and processing units for textiles are other schemes envisaged.

4.2.2. *Village and Small Industries.*—Apart from the traditional Small Industries and Handicrafts, the following are to be developed; Sericulture, manufacture of industrial felt out of goat's hair, glycerine out of edible oil, starch out of tamarind seeds, activated carbon from coconut shell industrial and domestic products out of palmyrah fibre, manufacture of straw boards and hard boards, fruit preservation and canning of fruit products, cotton seed oil and "Agar-Agar" from sea weeds. Also, such

items as electrical laminations, paint-drier alcohol, plastics, leather and rubber goods, caffeine from tea waste, chromium plating, glass containers, ceramic refractories, manufacture of motor gears, controls, relays, starters, etc., cables and winding wires, electric motor and pumps, fans, heaters and accessories, electronic instruments and equipments including radios and television are contemplated.

It is also considered necessary to increase the number of Industrial Estates of the functional type in the taluks.

4.2.3. *Mineral Development.*—The need for immediate establishment of a State-owned Mineral Development Corporation is urgent.

4.3. *Economic Overheads*—

4.3.1. *Power.*—The increased requirements of electric power will have to be met by *(a)* commissioning of the Atomic Power Plant at Kalpakkam, *(b)* taking up of new Hydel schemes, *(c)* 600 MW Thermal Station at Tuticorin and new Thermal Capacity of about 400 MW elsewhere in the State, *(d)* second mine cut and second thermal station of about 800 MW capacity at Neyveli, *(e)* addition of another 400 MW capacity at Kalpakkam Atomic Project; *(f)* second Atomic Project of about 1000 MW capacity south of Madurai.

These schemes can meet the deficit in energy of 19739 million units anticipated at the end of Fourth Plan period. However, there will still be an uncovered power deficit of about 1877 MW in respect of generation capacity to meet peak demand which has to be met through the import of power from the neighbouring States.

4,3.2 *Transport and communications.*— (1) *Roads.*— Development of the 1,796 kilo meters National Highways and the construction of the East Coast Highway are envisaged. Development works under the State Highways, and major district roads cover such items as improvement of bridges, widening and increasing the number of lanes, cement concreting improvements to geometrics of roads including special provision for pedestrian traffic, formation of bypass roads will be undertaken. A ring road connecting the three National Highways outside the city limits with a length of 32.4 kilo metres and the road to relieve the rapidly increasing congestion on Anna Salai to be built parallel to it, as also the South Cooum Road to be widened are the programmes in view.

(2) *Railways.*—Railway development comprises such works as (i) "cut and cover" under-ground railway in the North, South, East and West corridors of Madras City, (ii) Electrification of Madras-Arkonam line, (iii) Extending sub-urban service to Tiruvallur and Gummidipoondi, (iv) Conversion of most of the trunk lines into broad-gauge, (v) opening of a new line from Trivandrum to Tirunelveli with diversion at Nagercoil up to Cape Comorin, (vi) construction of over-bridges at railway level crossings, (vii) electrification of the line from Madras to Vijayawada, (viii) other new lines like Erode-Satyamangalam-Samarajanagar; Dindigul-Karur etc.

(3) *Road Transport.*—In view of the Government's policy of nationalising bus transport in stages, new buses would have to be purchased. Also, body-building workshops, bus depots, bus and lorry stands in the towns will have to be constructed. It is also proposed to expand Government retreading units. The number of workshops will have to be increased considerably.

(4) ***Inland Waterways***.—Widening and deepening of the Buckingham Canal and Vedaranyam Canal for better navigation facilities and the running of pleasure and passenger boats in the Cooum river and Buckingham Canal will be undertaken.

(5) ***Ports and Harbours***.—Additional facilities at the Cuddalore Port, development of Tuticorin Port, of minor ports such as Valianookam in Ramanathapuram district, a fishing harbour at Kaveripoompattinam and a fishing port between Arantangi and Adhirampattinam in the East Coast are proposed. The Sethusamudram Project and additional berths under these schemes are also planned.

4.4. *Development Services*—

4 4.1. *General Education and Technical Education*.—The major aim of the education system will be—

(i) to provide complete education to the age group 6—15 and in particular to the 9 lakh children, who are all from the 60 per cent poor group, who drop out of school in Class I, II, III and IV every year and 222.5 lakh people of Tamil Nadu who have now no education at all and

(ii) to relate this right to education directly with right to employment.

To this end, the programme envisaged will include—

(*a*) a ten-year schooling broken into stages to enable students smoothly to leave school at various points for employment or work at home and re-enter the school ;

(*b*) out-of-school education to all who leave school before Class-V so that all children in Tamil Nadu have the equivalent of a minimum of five years' schooling which is now available to only 40 per cent who enter Class I and the organisation of functional literacy to all illiterate adults;

(*c*) merging of school and out-of-school education by using the buildings, equipment, teachers, libraries, laboratories and workshops of the schools to provide continuing education to those who wish for it through correspondence courses, evening classes, radio and television instruction in general or vocational education and also meeting the Constitutional recommendation of education up to 14 years ;

(*d*) reforming curricula and teaching methods; to make them functional to the urban, rural, economic, social and cultural realities of Tamil Nadu, and vocationalising secondary education;

(*e*) internal assessments being used through school years except for Class-X at which a public examination will be held and for 65 per cent of whom Class-IX and X will be terminating as at present;

(*f*) the organisation of higher education in two years' intermediate, two or three years' degree course and two years' post-graduate learning, each stage corresponding to a higher level of skill, as for instance language-learning being completed in Intermediate, the Degree course being subject-centred;

(*g*) The intensification of the Tamil Nadu Universities as centres of excellence in post-graduate teaching and research with the possibility of entrusting under graduate

education to a State Council of Academic Awards or to newly created affiliating Universities which will put into effect a system of autonomous colleges, the Semester system and the internal assessment procedures ;

(*h*) promotion of scientific and developmental research through the following seven projects :—

The Tamil Nadu Academy of Basic and Applied Sciences;

Tamil Nadu Council of Development Research;

Tamil Nadu Institute for Life Sciences and Physical Sciences;

Hall of Science and Industry at Madras;

Tamil Nadu Educational Research and Testing Organisation.

Information Storage, and Retrieval Services.

Starting of a Technological University.

The expansion and development of International Institute of Tamil studies and allied projects;

(i) State financing of education to be based on free education up to Class-X, free out-of-school education so that the 60 per cent poor people of Tamil Nadu have the minimum of schooling and in the case of adults, the necessary literacy; financing of improved science and craft education at school; all higher education will be fee-based; scholarships will be based on merit-*cum*-means.

4.4.2. *Health, Nutrition, Family Planning, Drinking Water and Sanitation.*—(1) Health : The goal of Tamil Nadu health Policy is to improve the health of the population, particularly the 60 per cent who are not served today through an integrated administration of public health, nutrition and family planning.

(*a*) the improvement of health and medical services;

(*b*) the promation of the nutritional status with particular attention to the economically vulnerable segments of the population;

(*c*) a more vigorous campaign for family planning; and

(*d*) the provision of protected and adequate water-supply and sanitary facilities to all households, starting with the most backward blocks.

To this end, a small, economic and self-contained multi-purpose Dispensary will be established in each mini-health centre to provide maternity and child welfare, family planning, preventive and curative health, applied nutrition and medical relief services. A mini-health centre will serve 10,000 persons living in each block. Taluk Headquarters hospitals will be upgraded with a minimum of associated specialisation. They will also have a Siddha wing of ten beds.

Above these two will be the District General Hospital with a bed-strength of 650 and the entire range of specialities, together with a Siddha wing of 30 beds. The Doctor-population ratio will be raised to 1:3,000; hospital beds raised to 1:1,000 of population and number of nurses raised to one for five beds. The auxiliary nurse-midwife ratio will be stepped up to one in five thousand.

(ii) *Nutrition.*—The nutrition programme will involve reaching the vulnerable sections of children and pregnant and Nursing women through 12,500 new " Kuzhanthai-

gal Kappagam ", attaching pre-primary sections to primary schools wherever possible, and opening 2,500 creches along with the mini-health centres.

The family planning programme will reduce the present birth rate of 35 births per thousand to 25.

(iii) *Water-Supply and Sanitation.*—Over 70 per cent of all urban areas have already been provided with piped and protected water-supply. The remaining 30 per cent or 562 towns are accounted for by on-going schemes which should be completed by 1976-77. In the rural areas assured sources of potable water as distinct from that used for irrigation will be provided to all citizens of Tamil Nadu by 1975.

Construction of additional sanitary latrines, scavenge-pits, and other environmental sanitation works in the rural areas will be undertaken. Industries will be provided with safe-disposal arrangements and monitoring of the rivers and air for pollution will be arranged.

Arrangements will be made for necessary action on the conservation, disposal and re-use of water for drinking, irrigation and industrial uses as a single State-wide resource. Programmes will also be initiated for the prevention of pollution and contamination of the environment (the atmosphere and water resources in particular) by domestic and industrial effluents and fumes and gaseous emanations.

4.4.3. *Housing, Town Planning and Urban Development.*—According to present estimates, out of total number of houses, about 80 lakhs and odd, nearly half are of the Katcha type and require replacement. In addition about 42.8 lakh units will be required for those without any shelter now. All municipal towns in the State will take up the housing scheme in their respective areas by way of developing plots and selling them to individuals.

The scheme for the socialisation of urban development would involve :—

(*a*) Bulk acquisition of lands in cities and Municipalities at a compensation rate to be fixed by legislation;

(*b*) Urban development—roads, power, water-supply and drainage to be undertaken.

(*c*) The purchase and sale of urban lands which must be a State monopoly.

4.4.4. *Tourism*—With the formation of a separate Tamil Nadu Tourism Development Corporation, it will be possible to pay special attention to Tourism aspects and induce attractions for Tourists both internal and foreign. Propaganda and publicity in respect of the various rich cultural heritages of the State as well as beauty spots, archaeological finds and temple architecture are necessary. Provision has to be made for printing attractive pamphlets and folders in colours for distribution among tourists and for exhibiting the handicrafts and art mementos at important cities like Calcutta, Delhi, Bombay, Madras, Bangalore, Hyderabad and Trivandrum. A special scheme for training tourist guides and also enabling them to learn more languages is also to be provided for.

4.5 *Social Change and Development of Backward Classes and Areas*—

4.5.1. *Social Change.*—Realising the need to improve the social climate for economic activity, the creation of casteless and classless society is considered an urgent necessity and this goal will be approached from different angles—ideological, educational, social, legal and economic. The socially under-privileged sections, especially the Scheduled Castes and other Backward Classes will be effectively taken care of. The deterrents to economic initiative like superstition, casteism and inferior status of women will be removed by deliberate state policy. The social change is desired not only as a means to economic development but as an end in itself assuring self-respect and dignity of the human being.

4.5.2. *Welfare of work force, Labour and Management relations.*—Having in mind the welfare of the working class in the farms and in factories and having initiated studies for improvement of the machinery for settling industrial disputes, for preparation of incentive schemes and social security measures, efforts would be put in the direction of ensuring (i) fuller utilisation of installed capacity in factories, (ii) optimum use of agricultural and urban land, (iii) higher productivity of labour and capital, (iv) higher level of skill formation and (v) rationalisation and scientific management of agriculture and industry with a view to ensure that the benefits of production accrue equitably to all participants in economic activity.

4.5.3. *Employment, Welfare of Backward Classes and Areas.*—Development schemes envisaged under this include expansion of employment services, establishment of a Man-Power Centre, training schemes for craftsmen and the working out of new employment projects, besides welfare measures and social service schemes covering Scheduled Castes, Scheduled Tribes, Backward Classes and Women. Priority will be given to the development of Backward Areas. Emphasis is laid on investment for the reviving and developing of Tamil Culture as an effective means of bringing about the social change that would accompany and at the same time contribute to the economic transformation of the State.

SECTION V

5.0. *Financial Implications*—

5.1. The State outlay anticipated is of the order of Rs. 1,300 crores in the Fifth Plan and Rs. 2,600 crores in the Sixth Plan. This effort on the part of the State is anticipated to evoke resources from other origins. The table gives the board anticipation of resources from various origins to make up the total plan effort based on the past experience of resource-flows. Also, our sectoral and district plans will have to be so framed as to make this resources-availability a feasible reality.

Over the past plan periods the share of Tamil Nadu in Central Assistance has steadily declined as shown below :—

Central Assistance (RS IN CRORES).

	All States. (1)	*Tamil Nadu.* (2)	*Per cent of* (2) *to* (1).
Fist Plan	332	36	10.8
Second Plan	1,058	95	9.0
Third Plan	2,515	186	7.4
Annual Plan	1,763	119	6.8
Fourth Plan	3,500	202	5.7

Tamil Nadu does not get the 10 per cent share distributed among States in consideration of economic backwardness. There has not only been a continuous decline in the State's share of Central assistance, but also as a proportion of the total plan outlay of the State, it has decreased from about 50 per cent in the first 2 Five Year Plans, 54 per cent in the Third Plan to 48 per cent in the Annual Plans and finally to 39 per cent in the Fourth Plan. Even on a comparative basis, Tamil Nadu has a strong claim for a higher share as Andhra Pradesh gets 57 per cent, Madhya Pradesh 68 per cent, Orissa 72 per cent and West Bengal 68 per cent.

5.2 The size of the Fifth and Sixth Plans at 1970-71 prices is given below :—

Particulars.	*At 1970-71 prices.*	
	Fifth Plan.	*Sixth Plan.*
	(RS IN CRORES)	
1. State Plan (including Central assistance)	1,300	2,600
2. Central Sector	1,000	2,150
3. Private Sector—		
(a) Organised Sector	150	300
(b) Others	750	1,050
	3,200	6,100

It will be observed that in the investment pattern proposed above, the State Government's outlay is sought to be a little more than double in the Fifth Plan from Rs. 575 crores (1970-71 prices) to Rs. 1,300 crores (1970-71 prices) and doubled again in the Sixth Plan. This will no doubt severely try the State's powers of mobilising resources and the State Government will have to make unprecedented efforts not only to raise additional resources but also to effect economies in non-development expenditure.

5.2.1. *Savings and Investments.*— The State Net Domestic Product is estimated at Rs. 4,372 crores for the year 1978-79 in 1970-71 prices. Taking into account this State Net Domestic Product in the mid-year of Perspective Plan, the Warranted Savings Rate should be about 17 per cent to 18 per cent. This is necessary to ensure an investment of Rs. 3,200 crores and Rs. 6,100 crores to sustain the Fifth and Sixth Plans. The present savings rate is between 10 per cent and 11 per cent. This is a tentative estimate of the State Savings Rate, and studies in depth on savings and investment are being undertaken.

In the circumstances it would be reasonable to expect that the percentage contribution of Central resources will be larger during the Perspective Plan period than in the Fourth Plan. How large this shall be is a matter of Union-State financial relations.

5.3. In seeking to double its outlay in the Fifth Plan, the State Government can depend on :

(i) Fairer allocation of Central assistance ;

(ii) Increase in domestic savings and restriction of conspicuous consumption ;

(iii) The natural buoyancy of the taxes;

(iv) Improved tax administration and economy in non-development Government expenditure;

(v) Better management of the sources of non-tax revenue;

(vi) Open market loans;

(vii) Loans from the autonomous bodies; and

(viii) Contributions by State Public Sector enterprises and other Statutory bodies such as the Electricity Board.

5.4 In exploiting these conventional resources, the State Government can confidently look to the new plan strategy of combining production goals with distribution policies, the decentralised effort to be made at planning and development and the inspiring plan objectives it has set out to achieve, as invaluable aids to well up the springs of additional resources, adequate to fill the bill.

DRAFT PERSPECTIVE PLAN FRAME: SOME COMMENTS

by

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Tamil Nadu was the first State to set up a State-level Planning Commission. It has been followed by some others like West Bengal, which recently set up a State Planning Board. Gujarat brought out, earlier this year, a three-volume perspective plan, which had been developed by a Working Group set up by the Governor during President's rule. However, the major difference is that the plan was not the outcome of the efforts of a body set up by a popular government. Some doubts have been expressed in Gujarat about the commitment of the present government to the plan. As a first attempt at formalized planning at State level, the Tamil Nadu effort deserves study.

The first thing that is worthy of mention is that the document brought out by the State Planning Commission is not a "plan," as such and has been called "a Draft Perspective Plan Frame". It is only 16 pages long and contains a minimum of statistics. The operative words in the title are "draft" and "frame". To take up the second word first, the Commission has only attempted to develop an overall framework for the perspective plan. Unlike the Gujarat Working Group, it has not unilaterally attempted to prepare a detailed perspective plan, In Gujarat three academic and professional institutions were associated with Government personnel, namely the Indian Institute of Management, Ahmedabad, The Sardar Patel Institute for Social and Economic Research and the Operations Research Group. Without going into the merits of the Gujarat plan for the time being, what is worthy of note is the difference in the planning processes The objective of the Tamil Nadu Planning Commission in publishing only a frame seems to be to facilitate and allow for genuine decentralized planning at the district and block levels. The plan-frame has posed the targets, the problem dimensions and a broad choice of strategy. There are no presumptions about particular solutions and projects to be undertaken State-wise. Such a detailed exercise is left to the districts themselves.

The other word "draft" has rather less significance. As against this, the draft fourth five-year plan published by the Union Planning Commission was a more comprehensive and detailed document and as such, allows greater scope for debate. But the brief draft of the Tamil Nadu Planning Commission, about which some debate would probably be in order, appears less open to change in its basic goals and strategies.

The plan-frame postulates a rather ambitious set of targets for socio-economic development. In purely financial terms, it sets for the State a target rate of growth of 7.6 per cent each year on *per capita* real income, raising of the savings rate from about 11 to 18 per cent and the increase of the total State outlay on the fifth plan to twice that on the fourth plan. It proposes a similar increase from the fifth to the sixth plans.

The plan frame also states the major strategic choices which would guide the decentralized planning. In line with the current debate on the so-called new economics,

the document states that, while doubling *per capita* real income by 1984 is a major objective, there are other equally if not more important, and instrumental, objectives, such as (1) full employment; (2) a minimum needs progamme; (3) the reduction of economic and social inequalities in many dimensions—regional, class and caste-wise: (4) the acceleration of social change to facilitate economic growth; (5) the humanizing of economic development; and (6) the decentralization not only of planning but also the implementation of development programmes and resource mobilization.

As considerations governing the strategic choice, particularly worth mentioning is the observation in the document that many countries have achieved a rise in national income through direct attacks on the problems of poverty and imbalance and through an attempt to generate a "plan ethos" at all levels.

Without being over-enthusiastic, one may anticipate certain exciting possibilities of decentralized, State-level planning in India, using the Tamil Nadu plan-frame as a harbinger. The continental economy of India is far too diverse, intractable in its problems and rich in opportunities for unitary planning, unlike an insular island such as the U.K. or Japan. As an analogy, Europe's experience of development is much more relevant. In twenty years or even earlier, we might well witness on this continent a fascinating variety of patterns in economic and social development. Such variety could admittedly create some glaring inequalities. But then it is the function of the Union planning Commission to solve problems arising out of such incipient inequalities; it is a problem in inter-State relations. But on the positive side, there can be a great release of energy and creativity. The Tamil Nadu document gives evidence of such creativity and energy potential for growth.

Egalitarian principles pervade the plan-frame and might conceivably guide plan formulation and implementation processes in the districts. As a very simple example, the frame refers to absentee—"landowners"—and not "landlords". It is amazing that such a feudalistic expression as landlord should at all be currency in India still. After all landowners is what they are just like owners of other forms of property and productive resource. We do not, for example, think of an expression like sharelord.

Similarly, the plan-frame proposes that all socio-economic factors, which contribute to "hierarchical relations" in society, will be studied and the findings used for legislation and persuasive social action on a voluntary basis. In other words, the attempt is to improve the quality of life more than materialistically, and a major block to such improvement is identified as hierarchical relations inhibiting participation.

One of the criticisms of Indian planning so far has been that the mass of the people, who have been, by and large left untouched by whatsoever development may have taken place, have not been enthused and involved. The Tamil Nadu document specifically mentions the utilisation of the cultural heritage in the form of music, drama, literature, poetry, fine arts, films, folk dance, etc., for generating people's enthusiasm and direct participation in decentralized planning and development. One may recall here the genius of many great leaders, who could in a very simple, direct and powerful way use the legends and heritage of people to mobilize energies for development so massive in its effects that it resembled a nuclear explosion. Each in his own way, Gandhi and Mao achieved this in some measure in India and China respectively.

The planners are proposing a direct attack on one of the well-known problems of economic development—the non-marketability of infra-structure investment. One way in which infra-stucture investment can be brought within the ambit of market operations is to price the services. The tolls for bridges and turn-pikes are an example. In particular, with the proposed decentralization in resource mobilization operations, the pricing of services will in some measure be essential for local bodies. The document proposes the formation of autonomous boards or councils to look after the development of roads, water-supply, etc. They may impose cesses and taxes for raising revenues.

The document also accords prominence to science and technology. As an economy, we have so far relied mainly on the import of technical know-how as part of expensive collaboration agreements. There has been talk of the generation of intermediate technology particularly relevant to the needs of a developing economy. The Tamil Nadu Plan-frame specifically envisages the acceleration of the development of science and technology in order to harness the human and material resources of the State.

The document also gives indications of novel ideas which may come up in the course of decentralized planning. An example is the proposal that the State would stress the need for recruitment of fishermen to the Navy because of their sea-faring experience.

Quick results bode well for any planning effort. This helps by improving both the resourse base and by boosting morale. One such area of success for Tamil Nadu will be the completion of rural electrification by 1973. Although Lenin's dictum that socialism is equal to electricity plus was not meant to be taken literally, it has a poignant relevance in these days of power cuts. With the network of electric transmission lines reaching all the villages, Tamil Nadu has a valuable means for effecting decentralization and for the promotion of growth-centres and regional planning. However, it is only a base, because power shortage will contine even in 1984. While the document envisages development of all sources of power-hydro-electric, thermal and nuclear, the State wisely anticipates dependence on a regional grid.

A major challenge in planning which was till recently relegated to minor importance is the organizational strategy. The Tamil Nadu document appears to be an attempt at genuine decentralised planning. For this purpose, it goes beyond the 13 administrative districts and suggests a new concept of "development districts". This will be a homogeneus sub-region. Twenty-three such development districts have been proposed. Training in planning techniques is already under way for district-level planning officers.

The plan envisages a shift, between 1971–84, in the sectoral distribution of income and population. However, the primary sector's share of the population will decline from 63 per cent to only 60 per cent. Will a shift of this magnitude be adequate for the requirements of the Plan-frame ?

The perspective plan-frame can be regarded as a first major step in a series of steps to be gone through in any participative planning process. Those familiar with corporate planning at the enterprise level know that a participative planning process may have to go through the following steps :—

[1] Issue of top management guidelines stating assumptions about the environment, corporate objectives and targets;

[2] Alternative plans from geographical and product divisions proposing ways of achieving the targets;

[3] Examination by the top management and the corporate staff group of the plans proposed by the decentralized units ;

[4] A series of discussions and revisions to arrive at a consensus ;

[5] Detailed programming of the plan in readiness for implementation ;

[6] Inter-linking of the plan and the annual budget.

Likewise the Tamil Nadu State planning process may have to go through a sequence of such steps. The State Planning Commission has set up 15 task forces and 13 planning cells in the districts to generate various sectoral projects. A tentative list of "candidate" schemes has been mentioned. However, much inter-action, analyses, conflicts at intra-district, inter-district, district and State levels remain to be identified and resolved. Many forces, economic, political and social, will come into play. While some of the wrangling may have overtones of the spoils systems vigorous inter-action leading to the final choice of schemes is the crux of planning.

Referring to our earlier point about the possibilities of decentralized planning, it is interesting to note that the Tamil Nadu planning emphasises education specifically suited to the genius and needs of the people of the State. Both physical and social scientists are veering to the point of view that learning through one's mother tongue is less taxing and consequently, saves greater intellectual energy for innovation. The document also proposes the reform of University education and the introduction of such things as the semester system. Seven major projects for the establishment of centres of teaching, research, etc., have been proposed. These are likely to lead to a great socio-cultural renaissance alongside of scientific progress. At the same time, English education is not " de-emphasised ".

The plan envisages some very modern and progressive ideas. In the plan, the emancipation of women, nutrition and child care assume great importance. The establishment of 12,500 additional homes for the protection of children and the opening of 2,500 creches has accordingly been proposed.

In its pursuit of the quality of life, the Commission have also emphasised the importance of man's environment and the avoidance of pollution of rivers and air.

In any document of this scope essaying such magnitude of expenditure, there are bound to be areas of weakness. Therefore, in raising some questions, one should keep in mind the merits of the plan pointed out above. While postulating ambitious but very worthwhile targets, the plan-frame seems to be weak on resource mobilization strategy. However, decentralized resource mobilization is a new experiment and perhaps there is not much guidance that the State Planning Commission can offer. It is possible of course that the districts may come up with creative ways of resource mobilization.

There is some degree of *naivete* in the hope of the Commission that " scientific management " will lead to greater equality. This, of course, does not automatically happen. Social equality is not simply a question of technical efficiency. The State has recently suffered from the disruptive effects of discord in industrial relations. Any attempt at massive development that is envisaged in the plan-frame is bound to generate stresses and strains. But the formulations of detailed district plans, aggregating into a State-Plan, is the first step. Towards this end, the Draft Perspective Plan-frame is a signal contribution.

SECTORAL PROGRAMMES IN A DEVELOPMENT PLAN

By

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THE NEED FOR PLANNING

The basic objective in national economic planning is to utilize the resources in such a way as to maximise the benefit to the total economy. Obviously, the techniques of allocating and using the resources and the means at the disposal of the governments for implementing the schemes differ according to the ideology and institutional set-up of the country concerned, but the fundamental objective and principle involved are the same. Even among free enterprise economics, there is bound to be some difference in the means and methods of planning in so far as poor standards of administration, inadequacy of statistical data and scarcity of real and financial resources prevent the under-developed countries from making use of sophisticated techniques as compared with richer and more advanced countries. Nevertheless, the need for economic planning in either group of countries arises out of the basic issue of utilising relatively scarce resources in an optimal way.

(1) AGGREGATE PLANNING: ELEMENTARY TECHNIQUES

The first step in planning is to lay down a few clear-cut and realisable objectives; such objectives may be an increase in national and *per capita* incomes, creating greater employment opportunities, rapid industrialisation of the country or expansion of the agricultural sector or social or socialistic objectives, such as the improvement of the health and educational standards of the people, better distribution of wealth and incomes, eradication of poverty, etc. But whatever be the objectives, they are to be clearly defined, and to the extent possible, the targets are to be fixed in quantitative terms. Thus, in the matter of income, the objective may be doubling it in a given period of time, or raising it by a certain percentage. The target with regard to eradication of poverty or raising the standard of living may be expressed as ensuring average food consumption of a certain calorific value, or raising educational standards in terms of percentage of literates or improving health standards by increasing the average expectation of life or reducing the child mortality rate to a specified point and so on.

When the objectives are defined and the targets are fixed, the next thing to do is to estimate in a rough manner the investments required to attain the targets. The planning body should have a clear idea of the present resources position and the level which has been already reached in the area relating to the targets. In a low income country, the primary objective of planning for development may well be the raising of the *per capita* income. In fact, the attainment of the other objectives of a socio-economic nature are dependent on, and implied in, an increase in the State's national income and in the income per head. The present *per capita* income is known and if the target is that this is

to be doubled, say, in a period of 15 or 20 years, one can easily arrive at the level which total income should reach at the end of the period by multiplying the expected population of the target year by double the *per capita* income of today. The difference between the aggregate income of that year and the aggregate income of the present year will indicate the extent to which national income should increase in the given period of 15 or 20 years. This figure multiplied by the capital-output ratio would give a rough idea of the magnitude of investment required. Thus, if the desired income increase is Rs. 5,000 crores and the capital output ratio is 3:1 the investment required is Rs. 15,000 crores.

An estimate like this would help in calculating the annual rate of growth of income and also the savings required. If the current level of national output is 1000 and the savings from 6 per cent of the output, an investment of 60 would result in an increase in output of 20 if the capital output ratio is 3:1. If population is increasing at 2.5 per cent per year, the gain in *per capita* income will be no more than 0.5 per cent a year. This means that, if the population growth rate remains constant at, say, 2.5 per cent, an annual increase of *per capita* income of 1 per cent can be achieved only by raising savings and investment from the existing level of 6 per cent of the national output to 10.5 per cent [$10.5 \div 3 = 3.5$]. If savings cannot be raised to this extent, the only possibility of achieving a 3.5 per cent growth rate in income is to lower the capital-output ratio by resorting to investment schemes in which the returns would be relatively larger than in capital-intensive schemes. But then, this is a choice depending on policy objectives-rapid industrialisation or expansion of the agricultural and small industries sector.

It is thus clear that, when once the targets with regard to income and the period in which the targets are to be reached are fixed[1], the means that remain for stepping up the existing rate of growth will be limited to *(a)* finding out and making use of the optimal direction of investment; *(b)* raising the level of investment by raising the savings margin; *(c)* modifying the capital-output ratio or choosing those lines of investment which would secure the required growth rate with the investible resources available; *(d)* trying to secure more foreign aid and *(e)* so regulating the private sector that it contributes the maximum possible to national output.

(2) SECTORAL PLANNING

An economy is divided into different sectors: the consumption goods sector and the investment goods sector; the export sector and the home market sector; the farm sector and industrial sector, etc. However, from the administrative point of view, it would be advantageous to define the sectors in a more detailed manner on a functional basis. It is easy to identify about half a dozen large aggregations such as agriculture, manufacturing industries, small industries, economic overheads and social services or the tertiary sector. The problem is to formulate programmes of development for these sectors which would help in filling in the details and refining the aggregate plan.

It is important that the investment outlays envisaged by the different sectors should add up to the total for the economy and that the targets of growth fixed for the sectors fit into the overall rate of growth. When the aggregate income to be reached

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1. It may be easily seen that, if the target date is put off by, say, five years, the annual growth rate required will be less, and therefore investment requirements will also be less.

in the target year is determined, it would be possible to estimate a certain reasonable rate of growth per year. When this rate is determined, the total income for each year in the plan period can be calculated ; and this has to be apportioned among the sectors. The proportionate contribution of each sector to the total income in the base year is known. In the first year, agriculture may account for, say, 50 per cent and industries 15 per cent. In a dynamic economy, this ratio changes over a period of time in the normal course of economic development, but in a planned economy, this change may be deliberately brought about. Thus, over a fifteen-year period, agriculture's contribution may be expected to decline to 30 per cent and that of the industrial sector to rise to 25 or 30 per cent. Similarly, relative changes may be envisaged for the other sectors also. These proportions for each five-year period may be fixed in an arbitrary way. It is then easy to calculate the extent to which income generated in each sector is to rise, by the end of each five-year period. This desired income increase in a particular sector in a given time period multiplied by the capital co-efficient of that sector gives the investment required over that period of time in that sector. The sums of sectoral investments calculated for each year will be the total investment required for that year.

(3) MESHING SECTORAL PLANS WITH THE AGGREGATE PLAN

Since planning for the economy is done at the State level, and the various departments at the Centre are responsible for the efficient implementation of the plan schemes, proper co-ordination between the two agencies becomes all important. In other words, the plan drafted by the Government or the central agency. should be the result of an integration of the sectoral schemes. How is this co-ordination and integration brought about ?

The Central planning agency would fix tentatively the overall objectives, targets and outlays for the sectors, and the sectors would draw up project proposals within this broad framework. These would be reviewed by the former, modifications might be suggested and the proposals would be referred back to the sectoral agencies and so on ; the process would continue until the sectoral programmes are fitted in properly into the aggregate plan. The central exercise would consist in fixing the objectives as well as the time-period within which they are to be achieved, the savings available in the economy and the potential savings, an assessment of the sources of savings, the growth of population, and a tentative allocation of resources among the sectors. At this stage, it is obviously impossible to estimate the optimum allocation of resources among the sectors. The projects competing for funds will be so great in number that the judgment of informed and experienced administrators and disinterested individuals will be the best guide for apportioning the funds. The only important quantitative guide to the plan's sectoral allocations at this point is the current level of expenditure in each sector. At a later stage, revisions would have to be made upwards or downwards in the light of recommendations and suggestions from the sectoral agencies.

When the central proposals are sent to the authority for sectoral planning, the latter have to fill in the details and make concrete proposals for development. Work at this level involves (1) the sketching of a development model for each sector ; (2) the setting of production targets in fairly specific terms ; (3) the generation of specific projects and programmes ; (4) a cost analysis of the programmes ; and ; (5) the specification of a policy framework and the administrative means to implement the proposals.

In determining the feasibility of the programmes drawn up, by the sectors—not only technological factors but economic implications—are also to be taken into account. Here a crucial role is played by relative prices, the movement of which (actual or assumed) would reflect supply and demand conditions. The projects have to be evaluated on the basis of a cost-benefit analysis. But how to estimate costs and benefits? To begin with, the existing level of prices may be taken as the base and the cost of the project can be calculated more or less correctly. If a demand forecast of the output of the project is also made, it would be possible to say whether the assumed price will be an equilibrium one. Any excess of demand would indicate a rise in prices. Thus, if the existing prices are known, shadow prices can be assigned to any product according to its prospective relative scarcity or excess. The discrepancy can be set aright by repeated revision and modification of the proposals until finally an equilibrium position is arrived at. This is usually called the iterative process but the term is only an euphemism for the simple trial-and-error method.

What has been indicated above are the lines along which planning is to proceed if there is to be proper co-ordination of the sectoral programmes and proper integration of these schemes in an overall plan. The basic requisite of a workable plan is the consistency between the sectors on the one hand and between the sectoral programmes and the central plan on the other. In particular, this sort of consistency has four aspects. In the first place, it is clear that there must be a proper balancing of the financial resources and the total plan outlay. Financial resources here would mean all the resources available, from whatever source, to meet the expenditure. If domestic savings are inadequate and a gap develops, provision has to be made to close this by external aid or deficit financing. Secondly, there should be a basic conformity between sectoal and overall objectives. Sectoral programmes should be of such a nature as to contribute to the attainment of the overall objectives. If the overall objectives are full employment or increased foreign exchange earnings or a rapid growth in incomes, the sectors should be able to show that their programmes serve this end. Thirdly, there should be a balance of inputs and outputs. The development of one industry needs more power, transport facilities, etc., which are to be supplied by other sectors. Hence any programme for the expansion of the first should indicate the extent to which the latter are also to be expanded. This calls for an analysis of the demand and supply of the commodities and for the establishment of physical balance-sheets. Thus, if the economy is divided into two broad sectors the consumption goods sector and investment goods sector—the sum of the net outputs of both sectors must equal national income according to the consumption income ratio. If the consumption-income ratio is 0.8:1, then the ratio of output of the consumption and investment goods sectors must be 0.8:0.2 or 4:1. Lastly, there is to be a balance between foreign exchange resources and expenditures. This is of special significance in a developing economy which, in the initial stages of industrialisation, has to depend on foreign countries for its investment goods. The financial requirements of a development programme may be divided into domestic currency and foreign exchange requirements. The foreign exchange requirements of the sectors should be equal to the total foreign exchange earnings of the economy.

Considering the limitations of the administrative machinery in an under-developed country, the method of economic planning outlined above may be deemed to be adequate and feasible. But it certainly falls short of an ideal system. One obvious defect is that it is so time-consuming. The efficiency of it depends on the attention to details given at the

two ends—the central planning authority on the one hand, and the different sectors on the other—and also the promptness with which checking, cross-checking and revision can be done. Secondly—and this is more important—the planners would be concentrating mostly on the problems in hand and would be drawing up their programmes on the basis of the data available currently. Needless to say, over the plan period extending over 5 or 10 years, very important changes—technological, institutional and attitudinal—may take place which can certainly not be fully envisaged by the planners*. Moreover, the basic objective of planning is to bring about dynamic changes in the economy according to a desired pattern. None of these desired changes can be looked at in an isolated manner, regardless of what is happening to the other sectors. The implication of such interdependent changes cannot be foreseen, and to that extent, the plan would be unrealistic and create problems in implementation.

It is in this connection that modern techniques of planning come to the aid of the planner. These techniques are fundamentally based on the fact that most of the economic variables are quantifiable and easily lend themselves to statistical and mathematical analysis. The techniques that are relevant for our present purpose are three : (1) project analysis; (2) linear programming; and (3) the input-output method.

(4) MODERN TECHNIQUES

(i) *Project Analysis*

Even as the economy is divided into various sectors, each sector is divided into industries, firms and administrative units. For the development of these units, individual programmes or projects have to be prepared. If the sectoral allocation is fixed tentatively on the lines indicated earlier, the sectoral development programme has to be, by and large, a list of feasible projects to be executed in the course of the plan period. The first requirement obviously is to make a cost-benefit analysis of each project to the extent possible. In some cases, as for instance in water supply or sanitation, family planning, or any educational scheme, although theoretically it is possible to evaluate the benefits by both direct and indirect methods, it may not be practicable to make any definite assessment of their value in quantitative terms which would help the administrator. Neverthless, a choice has to be made among the proposed projects, a few having to be eliminated on the basis of some criterion. It is therefore necessary to indicate the relative importance or urgency of the various projects.

A project is the smallest unit of investment activity to be considered in the course of programming. It will be a technically coherent undertaking and can be executed by a private or public agency independently of other private projects.For example, building a factory, the construction of a bridge, the reclamation of a piece of land. A co-ordinated set of projects would constitute a programme.

* For this reason it is meaningless to encumber a long-term Plan. usually called a perspective plan, with unnecessary details. "Unlike medium-term plans, long-term plans do not include comprehensive programmes specifying sets of concrete projects together with time schedules for their implementation. They aim at the identification of the main problems that will become apparent in the future and deciding beforehand what strategies should be chosen now in order to prepare the respective sectors of the economy for the future solution of these problems." Krzysztof Porwit—" Perspective Planning in Poland. Basic Issues and Experiences," *Journal of Development Planning, No.* 3/29, United Nations, New York, 1971.

In evaluating the impact of a project, both the direct and indirect effects are to be taken into account, and set against the cost. A detailed and more or less exact calculation of cost, comprising capital cost, foreign exchange requirements, labour cost, cost of materials, etc., is possible, but as regards benefits, the difficulty of evaluation comes in. The benefits can be quantified in money terms over the years and allowances for variations in price made by imputing a money value for the product in the time-series. The present value is obtained by discounting the future values at current rates of interest. Where the benefits can be expressed in quantitative terms, the value can be estimated, making an allowance for the price factor, by an imputed value of money over the years in which the benefits arise, and then calculating the present value by discounting at the prevailing interest rate. But in several cases where the value of the benefit cannot be expressed in quantitative terms, it has to be a matter of subjective opinion or intuitive judgment. However, if these are to be included as elements in programming, they should be assigned some imputed values. Calculations of this nature give an impression of accuracy and logical reasoning underlying the proposals but the many imponderables should never be lost sight of.

One method which appears theoretically sound is the application of the social marginal productivity criterion to the problem of choosing among projects.* In estimating the social marginal product of a particular investment project, both indirect and direct benefits as well as the social cost and social disutility involved in the project are taken into account. Thus, the cost of materials, cost of labour, foreign exchange, etc., are set against new employment opportunities created, effect on the income distribution pattern, income growth, the balance of payments, etc., and the projects are ranked according to their net social value. Given the resources for investment, the projects are chosen according to this ranking.

A simple and more practicable method is to define the objectives of the aggregate plan and find out the extent to which a particular project will contribute to the attainment of these objectives. This can be illustrated by a simple arithmetical example.

Let the objectives of the plan be expressed as Y—increase in a national product; E—increase in employment; S—increase in savings; H—increase in some health index such as an increase in the expectation of life or a decrease in the infant mortality rate.

A project—Project I—will yield increases in the above four items and this is indicated by Y_1, E_1, S_1 and H_1. Similarly, project 2 will yield Y_2, E_2, S_2 and H_2. A value has to be attributed to these increases. Let these be p, q, r and v. Then the valuation of Project I will be $V_1 = Y_1p + E_1q + S_1r + H_1v$ and that of Project II will be $V_2 = Y_2p + E_2q + S_2r + H_2v$. We assume that the components on the cost side are two-capital invested represented as $k_1, k_2 \ldots K_n$ and foreign exchange required, $f_1, f_2, \ldots f_n$.

Let the desired increase in the plan objectives be as follows :

Y : Increase in the national product, Rs. 1,000 crores.

E : Increase in employment, 1 crore persons.

S : Increase in savings, Rs. 400 crores.

H : Increase in life expectancy, 1 year.

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* Kahn, A.E.: "Investment Criteria in Development Programmes," *Quarterly Journal of Economics*, February 1951, pp. 38-61 ; also Chenery Hollis, "The Application of Investment Criteria," *Quarterly Journal of Economics*, February, pp. 76-79.

The relative contribution of the two projects may be assumed to be.

Project I		*Project II*
y^1 Rs. 1 crore	... ...	y^2 Rs. 80 lakhs
e^1 500 persons	... ...	e^2 1,000 persons
s^1 Rs. 50 lakhs	... ...	s^2 Rs. 10 lakhs
h^1 0	... ...	h^2 1 year

In order to calculate the total value contribution of the two projects, we have to fix relative values for the objectives. Let us suppose that an increase in income of Rs. 1 crore = additional employment of 500 persons = increase in savings of Rs. 0.2 crore = an increase in life expectancy of 2 years. Then the valuation of Project I will be $1 + 1 + 2.5 + 0 = 4.5$ and that of Project II, $0.8 + 2 + 0.5 + 0.5 = 3.8$ If the costs involved are k_1 Rs. 2 crores and f_1, Rs. 50 lakhs and k_2, Rs. 1.2 crores and f_2, Rs. 20 lakhs and each crore of rupees in cost is fixed as equivalent to 1, then the relative cost of the two projects will be Project I, 2.5 and Project II, 1.4. Then cost-benefit ratio will be, Project I = $4.5 \div 2.5$ and Project II = $3.81 \div 1.4$.

It should be remembered that the values are fixed in an arbitrary manner depending on the planner's judgment. Also, only relative values are indicated in respect of the projects. Thus, if the objectives of planning change, i.e., if greater importance is attached to employment generation than to income creation, then the cost-benefit ratio of the two projects would change to the extent that the effect of the one on employment creation would differ from that of the other.

An estimate like this will only help in ranking the projects according to their relative values. The number of projects to be selected, and whether a particular project will be chosen or not, will depend on the resources available for investment and the rank of the project in the list.

(ii) *Linear Programming*

The preparation of the projects represents only the first step. A sectoral programme is based on such projects, but a sectoral programme has to be more than a list of projects pertaining to the sector. It would be possible, according to the simple method outlined above, to choose a certain number of projects according to priority, the aggregate cost of which would be within the financial limits fixed for each sector. But finance is not the only constraint. When the objectives are more than one—income growth, employment potentiality, effect on foreign exchange, etc.,—the constraints also increase in number, and it would be necessary to choose between alternatives from an overall sectoral point of view. For making an optimal choice, linear programming is the ideal technique.

A linear programming problem has the following elements:

(a) The objective function: i.e., the function whose value is to be maximized or minimized, e.g., profits or costs.

(b) The capacity constraints: the constraints represent the outer limit, e.g., total outlay possible, total employment or machine-time or store-house capacity available, These are the "side conditions" and the optimal solution is to be found within the limits set by these side conditions. It is possible that, in one line of activity, a particular

capacity, say, machines or store-house capacity, may be utilized in full but in another or others, not. Hence the side conditions are inequalities rather then equations.

(*c*) The non-negativity condition of the variables: out-put or the supply of any factor should not be negative or less than zero.

The problem is called linear because the variables and the expression to be maximized are all related in a linear way. The relationship is assumed to be constant and hence the inequalities involve only the variables multiplied by constants and added together. (An equation for a straight line is linear, $y = ax + b$ where a and b are constants; x is the independent variable and y the dependent variable.)

An illustration of the form in which a linear programming problem is expressed would give an idea of its significance in planning the development of firms within a particular industry or a sector consisting of several industries or economic units.

Suppose the total output of a certain number of firms is to be maximized, i e.:

max $f(x_1 \ldots x_n)$, $x_1 \ldots x_n$ being the firms. Let average output per given period of time of the firm be $c_1 \ldots c_n$. Then max $[f(x_1 \ldots x_n) = c_1x_1 + c_2x_2 \ldots c_nx_n.]$ Obviously, if the size of $x_1 \ldots x_n$ is increased, output can be increased indefinitely. But expansion of size is limited by the maximum amount of capital, labour etc., available. These are the constraints. For example, let $a_1 \ldots a_n$ be the various factors required, and $b_1 \ldots b_n$ be the upper limit to the availability of the factors $a_1 \ldots a_n$. Therefore, maximization of the output of all the firms must take place within the above constraints. That is to say, $\max[f(x_1 \ldots x_n) = c_1x_1 + c_2x_2 + \ldots + c_nx_n.]$ subject to the point $(x_1 \ldots x_n)$ being in some permissible or feasible set K, which is specified by a system of linear inequalities in the form.

$$\begin{array}{l}
a_{11}x_1 + a_{12}x_2 + \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad + a_{1n}x_n \leq b_1 \\
a_{21}x_1 + a_{22}x_2 + \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad + a_{2n}x_n \leq b_2 \\
* \quad * \quad * \quad * \quad * \\
a_{m1}x_1 + a_{m2}x_2 + \quad \ldots \quad \ldots \quad + a_{mn}x_n \leq b_m \\
x_1 \geq 0 \quad x_2 \geq 0 \quad \ldots \quad \ldots \quad x_n \geq 0
\end{array}$$

The inequality in the last line rules out negative output.

It can be easily seen that linear programming is ideally suited to sectoral programming in so far as it involves an optimization problem in respect of the various industries or other economic units within each sector. The objective function may be maximizing output or the number of people employed, or minimizing costs, and the constraints may be the total investment outlay envisaged by the planning authority, labour supply or the land and natural resources available, transport facilities, etc.

Any set of values $x_1^{\circ} \ldots x_n^{\circ}$ which satisfies all the inequalities is called a "feasible solution". The lower limit of course is zero output (but not negative output) and the "optimal solution" is the one which specifies that combination of output which is the maximum possible within the constraints. Thus if a particular combination such as $c_1x_1^{\circ} + c_2x_2^{\circ} + \ldots + c_nx_n^{\circ} \geq c_1x_1 + \ldots + c_nx_n$ for all sets of $x_1 \ldots x_n$ values

satisfying the restraints, then x_n° is called an " optimal solution. " The basic principle in arriving at an optimum is to start from a feasible point and proceed from one combination to another testing each for its effect on the objective function, leaving it out if it does not satisfy the requirement and finally reaching the optimum position.

However, from the point of view of planning, for the total economy, optimization of sectoral programmes cannot by itself ensure an efficient plan. This is because interdependence of sectors cannot be fully brought out in any scheme of streamlining the programmes relating to a particular sector. This is obviously inadequate because the expansion of any one sector consequent on the increased demand for its product would necessitate expansion of the other sectors which supply the inputs of the first. This effect will be both direct and indirect. The more advanced the economy and the larger the number of distinct sectors and the greater their interdependence, the greater will be inter-sectoral effects of what happens to any one of the segments.

(iii) *The Input-output Method*

The technique which is commonly used for studying inter-industry relationship is the input-output method which has become a powerful tool in theoretical analysis as well as for purposes of practical planning. The economy is divided into several sectors or units which are listed along a row and a column. The row figures indicate the amounts supplied by one industry to other industries and used by the latter in their production processes. The column figures denote what is taken in by a particular industry from other industries as its inputs. These figures relate only to supply and demand within the industries in their productive activity. But demand and supply within the industries form only part of what is produced by each industry. The remaining part meets other needs and is accounted for by "final demand" which is the sum of consumption, investment and exports minus imports. Sectoral demand plus final demand is "total demand". Along the columns, the inputs of each sector (i.e., outputs of other industries received as inputs) are marked. Total inputs plus value added give total income or supply of each sector. A simple arithmetical illustration is given below:

Sales/Purchases	x_1	x_2	x_3	x_4	*Sectoral demand*	*Final demand*	*Total demand*
x_1	20	15	10	12	57	43	100
x_2	8	30	25	18	81	65	146
x_3	13	17	22	8	60	52	112
x_4	7	20	23	25	75	47	122
	48	82	80	63			480
Value added.	25	64	73	45			
Total income or supply.	73	146	153	108			480

The model assumes homogeneous production function a linear relationship between factors and output, constant returns to scale, no joint production and no external economies. The product of industry x_1 used in industry x_2 forms a certain proportion

of the value of output of x_3. The ratio of the amount of the product of x_1 used for producing one unit of the output of x_3 is the technical co-efficient in respect of that industry. Thus, in the illustration above, total output of $x_3 = 112$; the amount of x_1's product used by x_3 is 10; hence the technical co-efficient is $10 \div 112$ or 0.09. If there is any increase in the total demand for the product of x_3, then not only will more inputs from other sectors be required by x_3 but the capital capacity of x_3 should also increase, i.e., there should be additional investment in x_3. This requires more investment goods, materials for which would have to be supplied by other industries. Hence a capital co-efficient has also to be calculated. Thus there can be a separate technical co-efficient matrix and another capital co-efficient matrix or there can be a *double cell matrix* each cell containing both the technical co-efficient and the capital co-efficient. An input-output table will be typically of the form :

$$
\begin{array}{l}
X_1 = a_{11} x_1 + a_{12} x_2 + \quad \cdots \quad \cdots \quad + a_{1n} x_n + d_1 \\
X_2 = a_{21} x_1 + a_{22} x_2 + \quad \cdots \quad \cdots \quad + a_{2n} x_n + d_2 \\
\cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \\
X_n = a_{n1} x_1 + a_{n2} x_2 + \quad \cdots \quad \cdots \quad + a_{nn} x_n + d_n
\end{array}
$$

Then terms *aij* denote technical co-efficients, i.e., the ratio of the input of the *i*th commodity to produce one unit of the *j*th commodity; the last term *d* denotes final demand made up of consumption plus investment plus exports minus imports. Thus we find in any one row the total output of any one industry 'say' x_2 and how the total output is distributed among the different industries plus final demand. Since the technical co-efficients are given and the value of *d* is known, the required change in output x can be known for any variation in *d* by solving for x.

For solving the simultaneous equations, the technical co-efficients are presented in a matrix and the industries $_1 \ldots . x_n$ and final demand figures are arranged in column vectors. Total demand *minus* final demand is the sum of the demand by different sectors. The technical co-efficients are expressed as fractions of one. Hence, when out of 1, the sectoral requirements are deducted, the balance will be equal to a fraction of the final demand : that is, sectoral demands + final demands = 1.

$$
\begin{bmatrix}
(1-a_{11} & -a_{12} & \cdots & \cdots & -a_{1n} \\
-a_{21} & (1-a_{22}) & \cdots & \cdots & -a_{2n} \\
\cdot & & & & \\
\cdot & & & & \\
\cdot & & & & \\
-a_{n1} & -a_{n2} & \cdots & \cdots & (1-a_{nn})
\end{bmatrix}
\begin{bmatrix} x_1 \\ x_2 \\ \cdot \\ \cdot \\ \cdot \\ x_n \end{bmatrix}
=
\begin{bmatrix} d_1 \\ d_2 \\ \cdot \\ \cdot \\ \cdot \\ d_n \end{bmatrix}
$$

The matrix equation is $A_x = d$. $x_1 \ldots x_n$ represent total demand and $d_1 \ldots . d_n$ the final demand. If the inverse of A exists, (that is, if there is A^{-1}), then $A^{-1} - A_x = A^{-1}d$ but $A^{-1} A^x$ is Ix which is the same as x. Hence $x = A^{-1}{}_d$.

(For the method of finding the inverse of matrix, *see* Appendix.)

The inverted co-efficient matrix multiplied by the d column vector gives the solutions for required values of x or total output. By giving different values for d, we can calculate the required values of x, i.e., output of $x_1 \ldots . x_n$ needed. Suppose we have the inverted co-efficient matrix, then,

$$\begin{matrix} x_1 \\ x_2 \\ x_3 \end{matrix} = \frac{1}{0.384} \begin{bmatrix} 0.66 & 0.30 & 0.24 \\ 0.34 & 0.62 & 0.24 \\ 0.21 & 0.27 & 0.60 \end{bmatrix} \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

d is the final output target in which $d_1 = 10$, $d_2 = 5$, $d_3 = 6$ in crores of rupees. Then $x_1 = 1/0.384$ [$0.66 (10) + 0.30 (5) + 0.24 (6) = 9.54/0.384 = 24.84$ crores.

Similarly, $x_2 = 20.68$ crores and $x_3 = 18.36$ crores. It means that, when the output of x_2 is fixed at 24.84 crores, the output of x_2 and x_3 should be 20.68 crores and 18.36 crores, if there is to be consistency in the whole production programme.

Introducing A Dynamic Element:

A development programme lasts over a few years and the planner has to envisage dynamic changes in the economy involving technological changes which imply changes in both technical and capital co-efficients. The illustration of the input-output model given above is a static one in which we assume constancy in the technical co-efficients. By anticipating technological changes and estimating the possible variations in the combination of inputs, it would be possible to apply revised ratios at desired intervals of time (say 3 years each) and modify the calculations accordingly. Furthermore, allowance will have to be made for changes in capital co-efficients as well. The available investment for a sector is total output of that sector minus its total supplies to the other sectors and for final demand. This residual amount multiplied by the sector's capital co-efficient will give the output of capital capacity for the next year. With that as the basis for the next year, the capacity level of production for the third year can be calculated. This is how the dynamic input-output model can be used to build up a long-term economic projection. Values of the co-efficients will have to be adjusted after each calculation in the light of recent experience. In this way a more consistent and satisfactory economic plan can be formulated.

This brief account of linear programming and the input-output method brings out clearly their complementary nature. While linear programming helps in formulating a streamlined model for a particular sector, the input-output method facilitates checking up the mutual consistency of the sectoral programmes. Further, the data collected for fairly detailed input-output table will be of great use in identifying the inter-relationship between basic economic variables which in turn would help in refining the sectoral models. For this reason, it would be ideal to start any serious exercise at comprehensive planning for an economy with a detailed study of the inter-industry relationships.

Data Needed for An Input-Output Model:

The reliability of an input-output model depends greatly on the number of sectors which it incorporates and the accuracy of the data used for calculating the co-efficients. Firstly, total production figures are to be obtained and the production of each sector is to be estimated. Value of output of each sector can be found by multiplying the physical quantities of each commodity during the year and then adding up. The next step is to compute the final demand. Foreign trade statistics give figures showing aggregate exports and imports commoditywise, which can be apportioned among the different sectors. Similarly, making use of statistics relating to consumption patterns of different income groups, the aggregate demand for final consumption goods can be estimated. The third step is to calculate inter-sectoral flows. This can be done by either tracing the sales of each sector's output to their final destination or by estimating the value of inputs of each sector directly. If both the methods are used, one can be checked with the other and a more reliable set of final figures arrived at. Lastly, as for capital transactions, which are the most difficult to estimate, reliance has to be placed on existing statistics. And if they are inadequate, the only alternative is to be satisfied with the data for the total amount of each sector's output allocated for the purpose of investment.

It is necessary to add that, in order to get fairly reliable data, we have to collect figures for a few consecuive years and then calculate the co-efficients.

(5) AN EVALUTION OF MODERN TECHNIQUES:

The value of the above-mentioned techniques for planning purposes depends very much on the availability of accurate data and competent experts to handle them. A mathematical model can be useful as a forecasting tool only if the parameters incorporated in it represent correctly the functional relationships in the real world. Apart from this, even in advanced countries, the practical value of these techniques has come in for serious criticism. The fundamental objection is that linear programming and input-output analysis are based on highly arbitrary assumptions such as the linearity of production functions and constant returns to scale. In reality, the techniques of production and the proportion in which the factors are combined change so frequently that any calculation based on static assumptions loses all its practical significance. An improvement in the organisation of a business or the streamlining of its administrative set-up would have a noticeable effect on its returns and profits, but the factors responsible for this improvement cannot find a place in any mathematical model. It is true that the techniques are being continuously refined and methods are evolved for tackling the problem of change and for optimization in a dynamic setting. Yet, the difficulties and problems remain, reducing the chances of accurate forecasting.

So far as under-developed countries are concerned, the difficulties are much greater. The main problem is paucity of data; published materials are inadequate and inaccurate with the result that much of the computation has to depend on improvised aggregate figures or on mere guess-work. The input-output method has been tried in some of the under-developed countries, but its reliability is questioned and while much time and talents are devoted to it as a theoretical exercise, there is a great deal of hesitation to take it seriously as a basis for practical planning. One severe limitation in underdeveloped countries is the fact that the interflow of inputs and outputs as between

sectors is very much limited compared with developed countries. The number of major sectors is small and most of their output is consumed by themselves; the flow to the other sectors is negligible so that if a detailed input-output table is prepared, the technical co-efficients get concentrated in the diagonal, cells, and in the others, the values of the co-efficients tend to be far too small to have any statistical significance. Clearly, any forecasting made on the basis of such a model will be highly misleading.

Nevertheless, even an elementary input-output framework can be of some help in making forecasts of certain fundamental variables. It can be easily shown that simple calculations with the help of such a model would contribute greatly to consistency in a development plan. Consider a model with only two industries whose total outputs are 303 and 200 each and the distribution of their respective outputs is as shown below :

	Industry–I	*Industry-II*	*Investment*		*Consump-tion*	*Exports*	*Imports*	*Total*
	(x_1)	(x_2)	I_1	I_2	C	E	M	
Industry I (x_1)	60 (0.2)	40 (0.2)	7	6	167	30	— 10	300
Industry II (x_2)	30 (0.1)	80 (0.4)	28	18	74	20	— 50	200
Income payments (value added)	210	80						290
Total	300	200	35	24	241	50	— 60	

Capital co-efficients are more difficult to compute than technical co-efficients. But even without capital co-efficients, an input-output table can be of use in determining the level of production in each sector to meet the demand for "the final bill of goods". In the above example, the final demand for the output of Industry I (x_1) is 200 and that of Industry II (x_2) is 90 (I + C+E—M), From this it is possible to compute the total output of x_1 and x_2 which is consistent with final demand. The ratio of output of x_1 used in x_1 itself to the total output of x_1 is 0.2 (60/300) and the ratio of the output of x_1 used as input in x_2 to the total output of x_2 is also 0.2 (40/200). The other two corresponding co-efficients are 0.1 (30/300) and 0.4 (80/200) and are shown within brackets in the table.

Let us assume that we are given only the value of technical co-efficients and the final demand figures and that total output figures (in the last column) are not known. The data available can be expressed in two equations with two unknowns (x_1 and x_2) and by solving, the values of x_1 and x_2 can be found.

$$x_1 = .2\,x_1 + .2\,x_2 + 200$$
$$x_2 = .1\,x_1 + .4\,x_2 + 90$$

i.e., $x_1 = 300; x_2 = 200$

The values of x_1 and x_2, 300 and 200, are important in that they are the only figures (given the technical co-efficients) that would balance inter-sectoral demand and final demand.

Despite their limitations, modern statistical and mathematical devices such as sectoral and aggregate econometric models, input-output technique and linear programming have certain decided advantages which need to be brought out. Undoubtedly, these techniques are an aid to systematic thinking on fundamental issues involved in planning for development. The inter-related variables in a modern economy, even when it is an under-developed one, are so numerous that their relative significance and the effects of their interaction can be understood only within the framework of a comprehensive model. Further, the difficulties that arise when an attempt is made to formulate a model and to use it have been the source of some benefit in so far as they have necessitated the collection of more detailed and more accurate statistical information which in turn has facilitated further refinement and improvement of the models, and the discovery of new inter-relationships between economic variables.

One important point in favour of mathematical models, particularly the input-output model, is their usefulness as a tool for checking up the consistency in a development plan. Apart from this, an inter-industry model helps in evaluating the possible effects of implementing different policy proposals or in suggesting alternative strategies for achieving the same objective. Assuming that the Government's policy is to increase investment or raise the levels of export or consumption, the question arises as to what extent sectoral allocations are to be revised and modified. Given a set of values of parameters and exogenous variables, the model generates a unique solution. A change in these brings about a change in the results. For example, a programme of rapid industrialization has important effects on exports and imports, on the agricultural sector, on the demand for consumption goods and investment goods, on the employment level, etc. Unless these changes are estimated and provision made for meeting the demands arising out of these changes, a development plan cannot serve its purpose.

This underlines the need for avoiding any sweeping denunciation of quantitative analysis or theoretical models on the ground that they are abstract or unrealistic. A theoretical model nothing more nor less than an aid to focus attention on the basic inter-relationships governing the behaviour of economic variables. It is a safeguard againt loose thinking on the part of the planner whose mind is otherwise likely to get bogged down in unnecessary details. The plan that would be drawn up only on the basis of a mass of factual data and on intuition and subjective opinion would be little better than an incoherent assemblage of tiresome details and hollow platitudes and would be definitely less practicable than one based on an internally consistent theoretical framework. Unfortunately, quite often this prejudice arises out of the lack of a dialogue between the so-called model builders and those engaged in planning and policy-making. A little effort on the part of the latter to understand the language of the former would enable them to examine the merits of the case with an open mind.

APPENDIX

THE INVERSE OF A MATRIX

If the Matrix is A, the inverse of Matrix A is expressed as A^{-1}

$$A^{-1} = \frac{\text{adj}A}{|A|}$$

(i.e) Inverse of Matrix A is the adjoint of A divided by the determinant of A.

The adjoint of A is the transpose of the cofactor matrix of A. Cofactor matrix of A is calculated by replacing each element of A by its cofactor with the proper sign. Consider a matrix of order 3 (i.e. having 3 rows and 3 columns) such as

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$$

The element in the first row, first column is 1. Its cofactor is calculated by deleting the row and column in which it occurs and multiplying the first diagonals of the remaining four figures and subtracting from their product the product of the second diagonals. First, keep out the first row and first column. Then $(3\times4)-(2\times3)=6$; 6 should take the place of 1. And the sign to be assigned to the number is determined by multiplying it by $(-1)^{i+j}$ where i is the row number and j is the column number. Since the place of the element I is first row and first column $i+j= 1+1=2$; hence $(-1)^2 =1$; i.e., 6 which now takes the place of 1 should be given a positive sign. The cofactor of the element in the first row second column namely 2 is $(2\times4) - (2\times3)=2$. This number, i.e. 2, now takes the place of the original 2 in the matrix. The number of the row is 1 and the number of the column is 2 and $i+j=1+2=3$ an odd number. Hence 2 now has to be given a negative sign because $2\,(-1)^3 = -2$. Working in this manner, the new elements in the Matrix will be

$$\begin{bmatrix} 6 & -2 & -3 \\ 1 & -5 & 3 \\ -5 & 4 & -1 \end{bmatrix}$$

This is the cofactor matrix and is expressed as A^c. The cofactor matrix is transposed by changing the elements of rows to elements of columns. Thus we have

$$\begin{bmatrix} 6 & 1 & -5 \\ -2 & -5 & 4 \\ -3 & 3 & -1 \end{bmatrix}$$

This is transpose of the Cofactor matrix and is expressed as $A^{c'}$.

The determinant of Matrix A is calculated in this way; select any row or column, multiply each element by its cofactor and add up the products. Thus elements in the first row of Matrix A are 1 2 3. Their cofactors are 6, —2, —3. Hence determinant of the matrix is 1 (6)+2(—2)+3(—3) = —7.

Adj of matrix A divided by det A is the inverse of A

$$A^{-1} = \frac{\text{Adj A}}{|A|} \text{ i.e., } -1/7 \begin{bmatrix} 6 & 1 & -5 \\ -2 & -5 & 4 \\ -3 & 3 & -1 \end{bmatrix}$$

$$\text{i.e.} \begin{bmatrix} -6/7 & -1/7 & 5/7 \\ 2/7 & 5/7 & -4/7 \\ 3/7 & -3/7 & 1/7 \end{bmatrix}$$

$A^{-1} A = I$. I being the identity matrix

and

$$\begin{bmatrix} -6/7 & -1/7 & 5/7 \\ 2/7 & 5/7 & -4/7 \\ 3/7 & -3/7 & 1/7 \end{bmatrix} \times \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Thus the principle in solving a system of linear equations is: first isolate the co-efficients which are constants and arrange them in matrix, form, Matrix A. Arrange the unknown variables on the left-hand side of the equation in a column vector, x. Arrange the known variables on the right-hand side of the equation in another column vector ***d***. Then the equation is AX = d. Invert matrix A and multiply the inverted matrix by d. we then get the values of x_1.

$Ax = d$

$A^{-1} A^x = A^{-1} d$

$A^{-1} = I$ hence $Ix = A^{-1} d$

but Ix is x hence $x = A^{-1} d$

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SECTORAL PROGRAMMING

By

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The concept of sectoral programming has significance both for centralised planning as well as for decentralised planning. Its due role in centralised planning was recognised in the allocations of outlays as between various sectors as well as in the need to fix priorities as between the physical targets of performance for the various sectors. In the case of regional planning, sectoral programming is more significant in that it goes a long way to achieve a balanced and inter-related growth as between the various sectors of economic development. In view of its two-fold importance, a considerable amount of thought will have to be bestowed on this aspect of planning.

When we think of sectoral planning, we always have in our mind the urgent need to co-ordinate the sectoral programming exercise. For example, it will not be possible for us to plan industrial development if we do not know our requirements of raw materials as well as of power. Power is an essential concomitant of planning. In other words, power planning has to precede industrial planning. So long as we do not spell out the demand for power for a particular period of planning activity, it will not be possible for us to proceed with the development of those industries which require a substantial quantity of power and whose power requirements have to be ensured. Similarly, power planning will not be possible without industrial planning. In fact, power planning depends upon plans for industrial development. Thus, power forms the basic infra-structure for economic activity. Planning for power and planning for industrial development can, under no circumstances, be done independently. It has been estimated that the requirements of power for Tamil Nadu in the year 1984 will be of the order of 5,500 m.w. Unless programmes for the creation of this amount of energy from various sources are planned for from now on industrial development will be halted.

In Tamil Nadu, the development of power during the First and the Second Five Year Plans proceeded at a fast rate. All the available resources were fully exploited. The availablity of power consequent on the measures taken during the first ten years of the planning era made possible quicker industrial development during the Second and the Third Plans. The same was the experience of Mysore. If power development had been slow during the period, Tamil Nadu would not be the third most industrialised state which it is to day.

Transport is another sector which is a basic need for the starting of industries. Without proper means of communication, it will not be possible to move raw materials and finished products to the places where they are needed. The laying of railway lines which will help the movement of coal, coke, limestone, steel, agricultural raw materials and products will quicken the growth of industries. Thus, movement is an important

factor in promoting industrial development. So, the tertiary sector has to plan taking into consideration the requirements of the primary and the secondary sectors.

Agricultural development can itself act as a spur to industrial progress. Many of our industries depend upon agricultural raw materials. The rapid progress of the textile industry will likewise depend very much on the availability of cotton at a reasonable price. Again the ready availability of cane in an identified area in large quantities with a high sucrose content is a potent factor for the growth of the sugar industry. Again, engineering industries depend very much on the availability of an adequate quantity of steel. It has been estimated that Tamil Nadu will require an annual supply of one million tons of steel if our engineering industries are to grow at a rapid pace. Therefore, the supply of steel has to be determined ahead and this can be done only by making the different sectors come together in a properly co-ordinated plan. Steel planning has in fact to be considered separately and should not be made a part of industrial planning. It may be well worthwhile to assign a separate sector to steel.

In sectoral planning, the development of skills on proper lines forms an integral part of man-power development. It is necessary to envisage and plan for a uniform and harmonious growth of skills as required of skilled labour. In India the disparity in wages between the skilled operator and the engineer is very high when compared to other countries. The difference is as much as six times and this has to be considerably reduced. This will go a long way to enable the skilled operators to aspire for higher positions and achieve them by sheer industry and ability. Also, it may be necessary to give an opportunity for the skilled operators to have the facility of technical education in the mother-tongue during their hours of leisure. Thus, we find that the development of proper skills along proper lines is an important factor in determining industrial efficiency as well as productivity.

Another aspect in sectoral planning relates to the difference in the economic conditions between the industrial labourer and the agricultural labourer. The agricultural labourer gets lower wages when compared to his opposite number in industry. The low wages in agriculture dampens the initiative for hard work. This gap in wages between industrial and the agricultural labourers must be reduced if the latter has to be more efficient. Wages actually constitute a part of the sector called "man-power planning," but it also forms the base for industrial development. This is to imply that a watertight division of the sectors should be avoided. What is really needed is a co-ordinated effort for achieving a higher growth rate through a harmonious development of all the sectors.

From what has been said above, it will be very clear that sectoral planning does not mean the undertaking of planning exercises in independent areas and in watertight compartments. Again, man-power planning is an essential concomitant of industrial development; but in its turn, it cannot be isolated from planning for education. Our system of education-both engineering and commercial-will have to be so oriented as to develop the right type of skills in accordance with the requirements of industry, trade and commerce. If the man-power planning exercise is undertaken independently of the requirements of industry, it may result in lopsidedness. In fact, planning itself is an integrated exercise.

The various sectors are inter-dependent and not independent. They are theoretically independent but practically inter-dependent. It is this inter-dependence between the different sectors that calls for a cautious approach to sectoral planning,

The best way to solve the problem of integration would be to have a co-ordinating committee which will be part and parcel of every sector. This committee should not consist of more than three members and it should be given the privilege of sitting with every Task Force for effecting the necessary co-ordination in the approach to planning.

I feel confident that my ideas will provoke discussion on the subject. The delegates to the Seminar will tell us of some of their ideas on various operational and other problems relating to economic development. I hope that they will bring out the inherent inter-dependence of sectoral programming and that they will show the way to a balanced approach to our planning tasks, which takes account of the inter-relationship.

INDUSTRIAL COMPLEX STUDIES

By

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1·1. *Introduction* : The organisation of Industrial Complex Studies is one of the main tasks which the State Planning Commission had undertaken for drawing up the Perspective Plan for Tamil Nadu for the period 1972-1984. The object of this paper is primarily twofold :[1]

(i) to present a brief survey of the growth of industrial complexes in Tamil Nadu, and

(ii) to indicate broadly the methodology that may be adopted in industrial complex studies. As regards the second aspect, it may be pointed out here that, this being a seminar paper, the methodologies indicated are not conclusive suggestions in the matter, but seek to stimulate discussion and evoke further thinking along those lines.

2·1. *The Place of Industries in the Economy of Tamil Nadu :* Before studying the growth of industrial complexes in Tamil Nadu, it will be pertinent broadly to survey the place of industries in the economy of the State. Though, as is well known, the economy of the State, as of the country as a whole, rests on the broad base of agriculture ; industry has a significant place in its economic structure. In the southern region, Tamil Nadu is the most industrialised State, and in the country as a whole, it occupies the third place in terms of industrial development. Historically also, the State has had a head-start in industrialization. From the early days of the East India Company, the region corresponding to Tamil Nadu has received a minor share in the impact of industrialization originating in Britain.

Though, as with the rest of the country, primary production is the most important economic activity in terms both of employment and output, comparatively, the primary sector in Tamil Nadu absorbs only a smaller proportion of the working force and accounts for a smaller share of the State income. Though, no doubt, the primary sector in Tamil Nadu still remains, in absolute terms, the largest single source of State income, the contributions of the secondary and the tertiary sectors have been increasing relatively in recent years. It has been assessed that, during the period 1960-61 to 1969-70, the economy of Tamil Nadu unobtrusively underwent a structural transformation (though the process was slow) and that there set in a decline in the relative contribution of the primary sector to the net domestic product.[2] On the other hand, it is seen that the contribution of the industrial sector to State income has gone up in recent years from about Rs. 98 crores in 1950-51 to about Rs. 351 crores in 1970-71.[3] In 1950-51, the percentage contribution of

1 The other important exercises pertain to (i) the District Plans, (fi) the Sectoral Profiles, and (iii) the Regional Plans.

2 Government of Tamil Nadu : *An Economic Appraisal 1971-72*, Madras, 1971, p. 6.

3 Government of Tamil Nadu Industries Department : *Industrial Growth in Tamil Nadu : Major Industries—A Review*, 1971-72, Madras, 1972, p. 2. The 1970-71 figure is a quick estimate.

the secondary sector to State income was 12·65. By 1970-71, it had risen to 21·94 per cent. This well indicates the growing importance of the industrial sector in the economy of Tamil Nadu.

2·2. *The Role of Industrial Complexes : Some Theoretical Aspects* : In Tamil Nadu, the factory sector of the industrial structure comprises most of the large and well-organized industrial units using modern techniques. Therefore, the State is ranked among the industrially better developed areas in the country. The major large-scale industries in the State are textiles, engineering and food industries, chemicals and agricultural processing.

As is well known industry grows by accretion. A large industry or a group of industries established in a locality lead to the development of many other industries in that locality as well as in other areas of the region. These industries or industrial localities grow, in due course, to be the leaders of industrial growth in the region. This is how, in historical experience, industrial complexes came to be understood under conditions of free enterprise. In the age of planning, forced changes occur. In Tamil Nadu the Neyveli Industrial Complex, the chemical and engineering industries developed under a planned impetus. In the years to come, the Tuticorin complex based on chemicals and fertilizers and the Salem complex based on iron and steel and aluminium industries will come into being. Besides these there are also to be others like the electronic complex at Adyar in Madras City, and similar growth centres in other parts of Tamil Nadu. The importance of these industrial complexes to economic development consists in their emergence as the new spear-heads of growth along with Madras, Coimbatore and Madurai. The location of the new industrial complexes in the State should be in the hitherto industrially under-developed areas, so that balanced regional development becomes a reality.

2.2.1. *Earlier Reasoning and Recent Developments*: It is indeed necessary to study the economics of the growth of industrial complexes as the industrial efficiency of any region is determined by the structure of its industry and the type of organisation that prevails. According to Sargent Florence, the three essential features of an industrial structure are (i) location, (ii) size, and (iii) the scope of operation or the type of integration.[4] The developments in macro-economics, welfare economics and research methodology, since the days of Florence, have been fundamental and varied. We may refer to a few of them in this paper. The manufacturing industries result from a combination of conditions largely geographic in their origin, and depend for their success upon such factors as raw materials, labour, market, power.[5] The influential criteria of choice in a context where localization was fixed by competition and natural conditions were nearness to materials and to markets, the availability of power, favourable climate, supply of labour, capital for investment in manufactures and the momentum of an early start due to enterprising leaders. This statement can be restricted in economic language; localization of industry depends upon the transport relations of each place and product with regard to natural resources, and upon the distribution of productive powers, such as labour, capital,

4 SARGENT FLORENCE, P : "Economic Research and Industrial Policy," The *Economic Journal*, December 1937, p. 621

5 LOKANATHAN, P. S., *Industrial Organization in India*, London, 1935, p. 55.

and organization, which govern the distribution of consumers' markets.[6] It may be noted that nearness to materials and nearness to markets mean more than geographical distances. These are largely a matter of costs. It may also be stated that, with reference to the ideal location in regard to raw material, the test is not the cost of a unit of material but the material cost of a unit of the completed product. Over-riding these factors is the progress of industrial invention which is perpetually draining the economic import of physical conditions.[7] Moreover, the various circumstances affecting localization of industry cannot all be regarded as basic elements or as given and unchangeable economic data. They are not only changing but greatly influenced by localization itself.[8]

3.1. *Location of Industries in Tamil Nadu* : Some of these issues may be considered with reference to Tamil Nadu. Needless to say, the State is deficient in mineral and forest resources and the deficiency in the former is marked in metallic ores and industrial fuel. Wherever mineral deposits have been located in the State, a cluster of industries has grown around these areas. The availability of good deposits of bauxite and magnesite in the Salem region has already attracted mining industries there not to mention others such as the extraction of aluminium from the ore. The working of the iron-ore deposits of Salem will soon foster an important industrial complex in the area. Neyveli lignite is already being exploited. With the considerable progress achieved at the Neyveli Lignite Project, there has been a rapid growth in the value of mineral production in the State. The reserves of lignite at Neyveli are being systematically exploited through a modern industrial complex to produce power, fertilizers and briquettes. The development of the complex is no doubt making a significant difference to the State's industrial growth.

3.1.1. *Cotton Industry* : The major trends in industrial location with reference to the cotton industry in the State may now be briefy indicated. The cotton industry provides an example of transport orientation. The development of Coimbatore as a chief centre of the cotton industry was due to the emergence of several factors which altered the transport relations of cotton and cotton yarn with the interior areas as compared to port towns. Among the various factors, the development of hydro-electric power, which made power supply possible to industry at a cheap rate, was one. Climate and the nearness of excellent consuming markets and the development of communications in the interior were among the other factors. All these contributed to develop a locational centre with the minimum of transportation costs. If the generation of hydro-electric power had been abundant, power transmission would have enabled the other cotton-growing areas in the State to develop the cotton industry. In later years, the industry evidenced a tendency for dispersion, and the degree of concentration in the original areas has not much altered. However, it has to be noted that, besides Coimbatore, other centres of the textile industry like Salem, Madurai and Madras have also developed. The major cause of this dispersion of the cotton textile industry is the development of hydro-electric schemes like those at Mettur and Pykara.

3.1.2. *Sugar Industry* ; Mention may also be made here of the sugar industry. Availability of excellent transport facilities and the availability of cane in sufficient quantities are the major factors that influence the location of a sugar factory. The care

6 OHLIN, B. : *Inter-regional and International Trade*, London, 1933, P. 191

7 LOKANATHAN, P. S. : *op. cit.*, pp. 56-57.

8 *Ibid.*

of the sugar-cane grower is as important as care in production technology. Sugar-cane, being a bulky and weight-losing raw material with high water and cellulose-content, its material index is considerable and therefore the industry has an attraction towards its raw material source. The industry was much concentrated in districts like South Arcot and Tiruchirappalli, and later, in Coimbatore. In recent years, there have been trends indicating a wider dispersal of the industry. Yet the bulk of the installed capacity of the industry is concentrated in the South Arcot and Tiruchirappalli districts. These two districts between them account for roughly more than 70 per cent of the State's production. Firms like Sakthi Sugars in Coimbatore district also hold out growth potential for agriculture in that region. This firm has achieved record results in full utilisation of plant and machinery throughout the year, which, in the seasonal sugar industry of India, is a rare achievement.

3·2. *Power, Chemical and Allied Industries :* From the point of view of industrial complex studies relating to the State, the sugar industry is an important one as the valuable by-products of this industry can be continuously utilized for the setting up of distilleries. Sugar manufacture yields large quantities of molasses and bagasse which accumulate as a by-product and which also present a serious problem of disposal for the sugar mills. However, in the State, the development of the sugar industry was not accompanied *until recently*, by the promotion of distilleries or a paper industry. There was only one distillery at Nellikuppam in South Arcot District, till 1965. Later, in 1966, another unit, owned by the Tiruchy Distilleries Limited, was commissioned in the Tiruchirappalli district. Besides the distillery, a carbon-dioxide plant has also been installed at the same centre. There is indeed a shortage of industrial alcohol in the country as it is being widely used for the manufacture of synthetic rubber, poly-vinyl chloride, (P.V.C.), polythene, cellulose acetate flakes and other compounds. The production of large quantities of industrial alcohol would promote allied industries in the area. The unit at Tiruchirappalli has also a programme for the manufacture of acetate chemicals based on alcohol. The bulk of the production of the Trichy Distilleries Limited will be sold to the Chemicals and Plastics India Limited for the manufacture of poly-vinyl chloride. The factory of the Chemicals and Plastics India Limited at Mettur in Salem District had been planned to have an initial production capacity of 8,000 tonnes of poly-vinyl chloride annually and the original intention was to double the production in a short period. It had also been planned to establish a Unit in Bombay for manufacturing extruded products utilising this P.V.C. For the Chemicals and Plastics India Limited at Mettur, thus some of the main raw materials (viz., industrial alcohol) are easily secured from a nearby source. The other major raw material, viz., Chlorine, is secured from the neighbouring manufacturing concern of Mettur Chemicals, Limited. The growth of one industry in a particular area has promoted the growth of allied industries in neighbouring areas or even in distant areas.

3.3. *The Manali Complex of Industrials* : It promises a boom for the economic development of South India. Locationally, the Manali Complex can also make a bid for foreign trade with South-East Asian countries. The issue of licence for production of nylon cord [9] at an investment level of Rs. 8.5 crores, and another project of Rs. 2 crores for the manufacture of carbon black are some of the ventures of recent years. The principle of the optimisation of the petro-chemical complex will not be satisfied, however, till a major effort to locate a naphtha-cracker plant complex is essayed. The international

9 KARUNANIDHI, M : *Tamil Nadu Budget Speech*, 1971–72, Part A, p. 12, Madras, June, 1971.

know-how for this is available only in a few countries and India has already gained access to this technique. It looks as though we are missing the opportunity of developing the Manali complex with a major and ready South-East Asian market for petro-chemical raw materials.

3.3.1. *Intra-national Project Appraisal* A major project of this nature is in the category of international and intra-national specialization. This study needs the help of international firms which have a sellers' market. A model report [10] for developing such a complex should incorporate appraisals of the following issues :

3.3.2. *Anticipation of Labour Supply* : The loss 1,000 mandays of work is to be attributed to labour strikes. In Tamil Nadu we lost 449 days as against 9,700 in West Bengal, 1,400 in Kerala and 1,200 in Maharashtra, Punjab and Gujarat lost only 103 and 67 days respectively. On this basis we can lay claim to having enjoyed moderate industrial peace.

3.3.3. *Net Labour Input* : The number of man-days lost for 100 workers could be another test. Arranging the States in the ascending order, we find that Tamil Nadu takes the eighth *rank proving that it is better* than six other states which follow. Tamil Nadu lost 122 days per 100 workers. The minimum and maximum days lost were 30 for Gujarat and 1,045 for West Bengal.

3.3.4. *Sophistication* : Besides these labour indications, *the value added* by Tamil Nadu industry each year to the State income gives a measure of the sophistication industries in the State, and its industrial outlook.

3.3.5. *Supporting Industries* : The Neyveli Lignite and the Madras Fertilizer are two major industrial structures which provide support through the absorption of by-products of the Neyveli Complex.

3.3.6. *Subsidies and Concessions* : The project report demands that concessional land, water, and power should be provided by the State Government. This needs to be examined in relation to the total benefit that will accrue from the complex in the nature of external economies, in addition to the alternative cost which the State would have incurred if it had to buy a number of petro-chemical products from other parts of India or the world.

3.3.7. *Macro-Welfare Data* : A project report of this massive nature relies on data about electricity, irrigation roads, level of education, health, building structure, the electricity tariff for agricultural and non-agricultural uses in different States of the country.

3.3.8. *Earning in Foreign Exchange* : The Project Report concluded with the argument that an annual earning of Rs. 5 crores in foreign exchange, besides the supply of 50,000 tonnes of polythene and a number of other products, would be available. A contemplated investment in the long run was Rs. 26 crores and the entire foreign exchange investment was to be raised by the Indian collaborator. This project has not yet materialised and one should examine how much the country has lost in terms of foreign exchange and scarce domestic raw materials forgone merely because of an inadequate understanding of the importance of utilizing a complex to the fullest extent.

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10 *A Report on the Manali Petro-Chemical Complex*, Madras, 1970.

3.3.9. *Direct and Indirect Employment Opportunities:* Employment opportunities to the extent of 3,400 in the main plant and 40,000 in the ancillary and small-scale industries, were also a distinct feasibility. The employment criteria also seems to justify a major complex of this nature.

3.4. *Scope for Employment*: Employment-wise, with about 15 million workers, Tamil Nadu has a big organised sector. The textile industry, which was merely relying on yarn production rather than fabric production, soon lost its importance. The emergence of the Guindy and Ambattur industrial estates, a large number of estates in district head-quarters and the spread of technology and engineering advancement have enabled the Tamil Nadu economy to avert a relapse. The future industrial employment growth depends on the development of the four major complexes: (1) the Manali complex; (2) the Kalpakkam complex; (3) the Neyveli-Salem complex; and (4) The Tuticorin complex.

3.5. *New Categories in the Industrial Economy*: The industrialisation of Tamil Nadu should effect an acceptable compromise between the claims of the people close to the zones who can expect to obtain employment and income in the main plants with the claims of others all over the State, who also ought to get assured employment and adequate income to break through the barrier of poverty. The earlier ideas of industrial location in terms of mere raw-material nearness, or skill nearness have given place to newer notions of taking skill to the workers and raw materials to the individual complexes. As an exercise in the techniques of Perspective Planning, a study of industrial complexes has a very wide connotation. In modern input-output studies, any economic activity including education, household and professional activities — not to speak of agriculture— is included as items of *industrial activities*. Whereas I am not adopting this Leontiff [11] concept of industry, I would find our discussion quite outdated, if mechanised agriculture and scientific processing of food articles are not considered as "industries". In this context, besides the well-known industrial complexes of Manali and Neyveli, we have to identify zones by the development of the following agro-industrial complexes: (i) dairy, (ii) meat-packing, (iii) fruit-canning, and (iv) oil-processing.

3.6. *Not All Large Firms Constitute an Industrial Complex:* The Bharat Heavy Electricals in Tiruchy or the Heavy Vehicles Factory in Ambattur are the giant production units which by their nature require a vast number of ancillary producers. Around these ventures grow houses, small-scale industries and allied economic activities, but to turn these into common production programme centres or individual complexes would be odd because their aim is not to produce a variety of goods but to generate a commodity meeting a specific commodity-demand like a heavy boiler or a tank. The development of ancillary industries of substantial size would arise when the ancillary industries meet the needs for a variety of goods required by the Manali or Neyveli complexes in due course of time.

4.0. *Techniques of Study:* The techniques of study of industrial complexes are common to macro-economics and industrial economics.

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11 LEONTIFF W.W: *The Structure of American Industry*, Harvard, 1947.

4.1. Some Important Aspects: They would cover among other issues :

(1) Cost-benefit appraisals of welfare and efficiency;

(2) Capital-investment appraisal ;

(i) The pay-back method ;

(ii) The peak-profit method ; and

(iii) The average-profit method.

(3) Regional and agro-industrial differences in location.

4.2. *Cost-benefit Analysis*: Cost-benefit analysis has (a) philosophical foundations, (b) foundations in economic theory and (c) and is encountered with in practice.

The objective function is to obtain

NSB = WTP [benefits] — compensation required [costs].

N.S.B.: Net Social Benefits measured in some common units. The word "benefit" socially implies the true reflection of the value of societies and the strength of preference for each stream of goods. The economist uses a measure of the consumers' willingness to pay (WTP). Cost-benefit analysis emerges in this context of balancing public expenditure against public gains with a valuation assigned to flows of services and goods like education and medical care. Paradoxically, they have the utmost effective potential for growth.

CAPITAL-INVESTMENT APPRAISAL

4.3. *Pay-Back Method*: This is the simplest technique in investment. The projects are selected whose profits are big enough to repay the amount invested within a chosen number of years.

TABLE 1

Years		0	1	2	3	4	5	6	7
Project A	...	100	30	30	40	30	0	0	0
Project B	...	100	30	30	30	30	30	30	30

Project A recoups the capital in three years, through profits. Project B takes a slightly longer time. Yet over the seven-year period, B makes 210 units of profit as against A which makes 130 units. The risk of this pay-back method is that we may err in the understanding of the time-span.

4.3.1. *Peak-profit Methods*: The level of profits in the best year is identified and is expressed as the maximum realisation of an investment.

TABLE 2

Years		0	1	2	3	4	5
Project A	...	**100**	**20**	**40**	**60**	**40**	**20**
Project B	...	**100**	**50**	**50**	**50**	**50**	**50**

Project A has a peak profit return of 60 per cent compared with B's 50 per cent return. B is still better as its profits are higher than A's in all years except one.

4.3.3. ***Average Profit Method:*** It is a traditional method of the security-minded class of industrialists. The average profit is expressed in terms of initial investments without considering the appreciation of capital values. The average depends largely on the number of years counted or ignored.

TABLE 3

Years		0	1	2	3	4	5	Total Profit	Average Profit	Rate of return
Project A	...	100	20	30	40	50	60	200	40	40
Project B	...	100	60	50	30	30	20	190	38	38

Project A is preferred to B because it yields a higher rate of 40 per cent to B's 30 per cent. This is misleading if projects are of long-term duration and if the products are different. 20 per cent in ten years cannot be better than 15 per cent in 20 years.

LOCATION

5.1. *Location*: Location theory takes into account the characteristics of the products, prices, wages transport costs, agriculturist's need for space, industrialists' concentration on land. A number of new techniques has been developed by Losch.[12]

6.1. *Financial Institutions and Industrial Complexes*: *An issue in Economic Administration*: The Industrial Policy Resolution which was drawn up 16 years ago still holds the ground. It is now outdated, self-contradictory and unrelated to advancement in science and technology. The identification of certain products as the exclusive privilege of the public sector is a futile policy. The Chinese strategy of producing steel in small plants seems preferable to the huge complexes, which crowd some parts of India and create transport diseconomics. So too is the contemplated policy of producing goods of mass consumption in the public sector which has nothing to commend it. The public sector would thus invite themselves into realms strictly kept for the private sector. In the organisational study of individual complexes, if we have to identify the best profit level, it is done in monetary terms. Yet, a private firm like TISCO owned by the House of Tatas

12 **LOSCH, A**: *Economics of Location*, Newman, 1954.

has about 38 per cent of equity capital held by public financial institutions. The ACC has a public investment of 40 per cent in equity capital. ESCORTS and VOLTAS account for 40 per cent and 30 per cent in public institutional finance in the form of equity. Having held 51 per cent of the holdings of the Indian Iron and Steel Co. (I.I.S.C.), the much advertised recent take-over by the Government of India was in financial terms just much ado about nothing.

6.1.2 The leverage which the Reserve Bank of India and other financial trusts hold in sharing the major industries in India is almost effective in theory though not in practice. The errors which creep in frequently are attributable not to the main firm but to the ancillary industries. Instead of the controversy resting in the public sector–*versus*-private sector area, it should now shift to a sober policy in terms of a macro-appraisal of large regions which any major complex services. This calls for managerial decentralization and not remote control by the far-off departments of any Ministry. The economic performance of each major unit is to be assessed in terms of the total contribution the firm makes with all other associated firms.

6.1.3. *Contrast between Island Economies of Japan and the United Kingdom and Continental Economies of India and Russia*: In island economies like Britiain or Japan, what is considered as the foreign balance of payments or terms of trade has to be viewed as internal payments within the vast continental economies like those of India, China or Russia. In terms of inter-regional gains and inter-regional balance of payments, this study becomes significant because these are trade activities in the same currency, and absence of foreign trade regulations make accounting easy and more helpful.[14] (1) A steady growth of the region, (2) a gradual improvement in the standards of living, (3) a stable policy of prices for local goods and (4) a high level of employment in the region are some of the important macro-tests of the viability of an industrial complex in growing economies with open or suppressed "international" trade relations.

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14 DAS GUPTA, A.K. and HAGGER, A.J.: *The Objectives of Macro-Economic Policy*. London, 1971.

REGIONAL PLANNING—CONCEPT AND PROCESS

By

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Although Regional Planning is itself not a new concept, having been applied by the T.V.A. for the development of the Tennessee Valley in the U.S.A. early in this century and later in the formulation of a plan for Damodar Valley, its application as part of the overall development process of a nation has emerged only in recent years. In the post-war era many of the newly free countries emerging to political independence realised the importance of planning at a national level to raise the levels of income and standards of living of the people with optimum utilisation of available resources. Planning from the top, as attempted in the first two Five-Year Plans of our country, served to raise production and income on a national scale, but failed to give equal opportunities for sustained growth in the different States of the country. Even within the States, the benefits of planning tended to accrue to those parts or areas which were already prosperous. Thus it was seen that disparities, as among States and as among forward and backward areas within States, widened. Even such large projects as a steel plant in a backward area was found to benefit the people of the concerned areas only marginally, the lion's share of the benefits going to the new migrants to these areas.

Regional planning is now being experimented with as a tool to prevent such un-balanced development. The objectives were spelt out broadly in the approach to the Third Five-Year Plan.

> The two aims—increase in national income and more balanced development of different parts of the country—are thus related to one another and, step by step, it becomes possible to create conditions in which resources in terms of natural endowment, skill and capital in each region are fully utilised. Sometimes the sense of lagging behind in development may be due not so much to a slower rate of overall growth in the region as to inadequate or tardy development in specific fields, such as agriculture, irrigation, power or industry or employment in each region. The nature of the problem and the impediments to rapid development in particular fields should be carefully studied and appropriate measures devised for accelerated development. The essential object should be to secure the fullest possible utilisation of the resources of each region, so that it can contribute its best to the national pool and take its due share from the benefits accruing from national development.
>
> The growth potential of each region should be fully developed but the precise manner in which this goal is achieved and the stages of growth will not be identical. Some regional factors, such as those connected with physical features and geographical location, cannot be easily altered, but there are others which can be influenced by raising levels of education and skill, developing power and generally, by applying science and technology on a large scale.

Large-scale industries, specially basic and heavy industries, frequently serve as a spearhead of intensive and broad-based development. However, not all regions can offer equally favourable conditions for the development of industry. It is also possible to overestimate the significance of the location of large industrial units in relation to the living standards of the bulk of the population. There are many examples, both of countries and of regions within a country, in which with limited development in industry, an appreciable rise in living standards has been achieved through the fuller utilisation of local, natural and human resources. There are also instances of areas around massive projects where no great impact on the levels of living of the people is to be observed. Apart from the basic and capital goods industries and other large industries, there are other industries whose possibilities need to be fully explored, such as labour-intensive industries of the traditional type, small-scale industries of the modern type, agricultural processing industries, forest industries, assembly operations and recreational industries. Each region should endeavour to identify, plan for and promote industries which are specially suited to its conditions and for which it can provide relatively greater facilities.*

Planning, to be successful under this approach, must start at the level where improvements can be felt, i.e., at a level much smaller than a State, say, a district or a group of districts.

Regional planning today has, therefore, come to mean much more than mere planning of a particular area like the T. V. A. or the Damodar Valley mentioned earlier. It is the planning of a series of small areas—each a viable one which, fitted together, will form a State plan at the first stage and national plan at the higher stage. Thus every part of the country will find its appropriate place in the regional plan and so in the State and national plans.

The term "planning" in regional planning has also a different connotation from that normally used with reference to a country. In the latter the emphasis is mainly on economic aspects. At the regional level the emphasis is equally on economic as well as the physical or spatial aspects of planning on the one hand and on the urban and rural sectors on the other.

It was the Economic Commission for Asia and the Far East as an organ of the UN which first highlighted the importance of these aspects of regional planning in the seminar it conducted in 1958; it stressed the need for a comprehensive approach to planning where the role of physical planning as an integral part of economic and social planning was recognised. The findings of this seminar can be summarised as follows :

(i) Regional planning would provide the most suitable frame of reference for a balanced integration of development projects of national/State significance and those based on local initiative ;

(ii) It would apply to the development of metropolitan areas to—those in which national resources are being developed as well as to rural construction programmes and to the location of industries ;

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* *Third Five-Year Plan*, Government of India.

(iii) It would help in establishing a better urban-rural balance which is needed to stem the flow of migrants to the cities;

(iv) It would help to avoid or reduce other unwanted consequences, such as slums and over-crowding.

On the subject of industrial location, the Seminar raised the following questions:

Should the new industries be centralised and integrated or should they be widely dispersed with a view to avoiding concentration? How could they be co-ordinated with other development processes, such as housing and the provision of other facilities like markets and public buildings? Is the land needed for them available in the appropriate locations? One of its important conclusions was that "industrialisation programmes linked to regional planning measures, might make it possible to direct migratory population groups to smaller towns and away from congested metropolitan areas and large ndustrial centres, thus assisting in the development of rural areas".

In our own country the concept of regional planning which was first made public in the draft of the Third Plan document as a step to increase the national income and achieve a more balanced development of the different parts of the country; but it did not make much headway. A few States in the couptry made attempts to plan for some of their backward regions rather than use regional planning as a tool for the total development of the State.

The Tamil Nadu Government, which has been a pioneer in the field of spatial planning, realised that the problems thrown up by the steady growth of population, industrialisation and rapid urbanisation could be handled only through an integrated regional plan where physical planning would be adopted to fulfil the needs of economic development. It has taken up the formulation of regional plans for the entire State after delineating eight main development regions based on physical, social, economic and other characteristics.

This concept of regional planning is of course a new one and although its objectives are now better understood, no set methodology has yet been evolved, but basically, the preparation of such a plan would proceed from regional and local studies towards a concerted strategy of action for the State as a whole.

REGIONAL STUDIES

These are the most important and represent the starting point not only for determining the present stage of development of the area in relation to the rest of the State but also to bring to light all resources within the region which can be utilised in furtherance of its development. The main themes of regional studies would include: (i) the local population and its characteristics; (ii) physical resources in terms of exploitable agricultural and mineral wealth, power, and tourism potential; (iii) the existing industrial set-up and structure; (iv) spatial patterns of urban settlement and their relationship with the rural hinterland; (v) the availability of an infrastructure, such as roads and railways, water supply, power, marketing, educational, medical and other social facilities; (vi) the contemporary status of the regional economy; and (vii) an evaluation of the development programmes completed and others that are under way.

Although the subjects listed above look familiar, the achievement of a successful study is beset with many problems. As far as population and its characteristics are

concerned, the census figures no doubt provide much information but the gaps in migration and unemployment figures obscure the associated demographic problems and render a clearer understanding difficult.

In the agricultural sector, the most serious impediment is the lack of data on ground-water supplies. In the industrial sector information is lacking in the sphere of production, differences between installed and utilised capacities and labour productivity. Surprisingly, these are easily obtained to a much larger extent in the small and cottage industries sector which are vital to development at the regional level than in the large, well-established factories.

Practically there thus exists little information that has already been analysed and is readily available—on trade, commerce and services which form an important segment of the local economy and in many cases the only worth while sectoral source of income and employment in the life of the region. The same is true of regional income computation.

Most of the available information is at the level of a district which is rarely a development region in itself and more often, forms part of the region. Sometimes it may be larger than a development unit. Thus, information as pertaining to a lower administrative level, say, a taluk or a panchayat union, then becomes essential.

Practically, in every sector, there is need to frame questionnaires to elicit the information not otherwise available, and the collection and analysis of these data involve money and time. A continuous flow of information on all the above aspects and the evaluation of programmes undertaken are basic to an analysis of the problems of the region and for suggesting a plan of action.

REGIONAL ANALYSIS

The object of regional analysis is then, to

(1) forecast the population of the region over a period of time and identify the problems of distributing them in various ways over the region ;

(2) find out the most optimal land use ; first, broadly under agriculture, industry, recreation, settlements, etc., and next, under each main use as for example under agriculture. What would be the best cropping pattern suited to the area taking into consideration, the quality, of land, irrigational facilities, present and potential, the quality of manpower and other inputs ?

(3) identify industries suitable for location in the area ;

(4) identify the missing or weak links in the traffic and transportation systems ;

(5) pinpoint the gaps in the infrastructure and social services within the region ;

(6) find out how far resources can be mobilised from within the region for its development.

This is not easy. If the gaps in the information system are wide, that in the techniques and tools available for analyses, is much wider. The building and testing of models on regional income, land use, analysis of commodity flows and framing of input-output tables all require sophisticated techniques and sometimes. the use of computers. Much remains to be done both in the field of research and its application to the problems on one's hands.

REGIONAL STRATEGY AND THE PLAN

The final plan will emerge only after various possible strategies with respect to cost, benefits have been tested and the speed with which the plan itself could be implemented. Above all, it should spell out areas for action. The content of a regional plan emerging from the studies and analyses would be one suggesting

(1) population distributions and settlement patterns including location of growth centres;

(2) the optimum pattern of regional land use and types of economic activities best suited for the region;

(3) improvements to the regional traffic and transportation systems;

(4) the quantum of infrastructural needs—housing, education and social facilities and their spatial distribution;

(5) a policy for the spatial distribution of economic activity to be followed by both the public and private sectors;

(6) a detailed investment pattern under the public sector to achieve the target for the economic growth level and the level of employment for the region, keeping in view the overall requirements of other regions and the State as a whole in the long term (say, 15 to 20 years) and a break-up of this programme into five-year action programmes.

It will be evident from the foregoing that successful planning would call for a continuous adjustment as between overall goals set for the State and the needs of the various regions. It is needless to add that regional plans for all the areas of the State should be available simultaneously as otherwise it will not be possible to tie up the requirements of the regions with the total available resources.

I have attempted to set out in this paper some thoughts on the concept of regional planning as it is emerging, the many handicaps that bogus down in the formulation of such a plan and the process of planning itself. But a stage has been reached in our country where immediate steps have to be undertaken with vision, forethought and determination to stem the haphazard and unbalanced development that is taking place around us. The opportunity, however, appears to be passing us by. The earlier work of this kind is launched, the better it is for the nation. One of the most important tasks today, therefore, is to set out, in the light of available information and techniques, the pattern of development which would provide the frame-work for individual decisions. Regional planning is essentially an inter-disciplinary and inter-governmental effort where every one having something to do with the development of the region should not only contribute to its formulation, but be responsible for its effective and balanced development.

THE ECONOMIC PARAMETERS OF BACKWARDNESS IN THE INDIAN UNION 1951-1971

A TENTATIVE MODEL FOR INSTITUTING PROGRESS FOR BACKWARD REGIONS

By

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In the Age of Social Justice, it is natural that new and forceful attention should be directed to the elements of backwardness in many States of the Indian Union and, more pervasively, in many districts in otherwise advanced States. The measure of inequality between the fast moving regions of the Indian Union and the so-called backward districts is widening. This is no different from the general problem of the widening gap between "developed" and "developing" areas, for, in fact, the prime element in development is accumulation of those human and economic resources which accelerate future development. Where these resources are lacking, the tendency for stagnation persists, and thus it should not cause surprise that the unequal character of development in the Indian Union over the last decade displays this widening gap between the "advanced" and the "backward" areas. What is frustrating in the current debate is that no precise estimates are yet available on the degree of backwardness which persists and the major elements which go to its making. The purpose of this paper is to attempt, on the relatively scarce material available, a more precise measure of the degree of backwardness amongst the States of the Indian Union. Thereafter, an attempt is made, again on evidence which is by no means complete, to demonstrate the force of two major instruments of gross income growth, namely, irrigation in agriculture and net value added in industry. These are the prime elements in explaining the differentials which currently occur. An equation, still largely tentative, has been developed to show the "average" effect in India of an increase of one per cent in the percentage of irrigated to total sown area in a State on the Gross Domestic Product *per capita* for that State. Similarly, the effect of a rise (or fall) of one per cent in the net value added in the industrial sector is assessed, so that one can estimate the extent to which the lack of irrigation and lack of industrial development have been separately but cumulatively responsible for backwardness.

It may hastily be concluded that the irrigation percentage and the net value added in industry can be increased so that an escape from backwardness can be found. However, this raises the question of the extent to which irrigation can be indefinitely increased: this is both a physical and financial problem. The extent to which a massive investment required to raise net value added in depressed areas, now believed to number 217 districts of 356 in the Indian Union, raises a severe financial problem. As always, resources for both irrigation and industrialisation will be "scarce", unless these are profitable investments (which is unlikely). And if both are restricted either by physical or by financial constraints, the prospect of a removal of backwardness is bleak. Therefore while experience leads to the identification of irrigation and industry as obvious priorities, there

are great limitations in attacking backwardness by these instruments alone. What then is to be done ?

The answer that is given is that a major break-through must be made in dry farming if the break-through from backwardness in most States of the Indian Union is to be made at all. For, in view of the competition from viable schemes in industry, it is doubtful if industry in the backward areas, notwithstanding certain financial incentives to be granted, can in a short period change the structure of net value added except in special cases. These areas are: the agro-industries, particularly animal husbandry and silk, tobacco, oil-seeds and textiles which are in a far better position to develop in the backward regions than the heavy producer goods industry which have good reason to be located where they are.

II. THE MEASUREMENT OF BACKWARDNESS : DIFFERENTIALS AS BETWEEN STATES

The first point in the measurement of backwardness is to assemble the criteria which are ordinarily applied to assess the differentials between the States of the Indian Union. Table I gives the *per capita* net domestic product of the States set out in three groups: (*a*) five advanced States, Punjab, Haryana, Maharashtra, Gujarat and Tamil Nadu, (*b*) five "average" States, Assam, Mysore, Andhra Pradesh, West Bengal and Kerala, and (*c*) five "backward" States, Madhya Pradesh, Uttar Pradesh, Rajasthan, Bihar and Orissa, It will be seen that the *per captal* income of Punjab, which was the highest in India in 1969-70, was thrice that of Orissa which was the lowest for the country. The all-India *per capita* income average for that year was Rs. 594. It is clear that it will be a major undertaking to raise Bihar and Orissa to this level. It is not so clear, however, that the "average" States cannot be impelled through concentrated attention on their depressed areas from catching up with the country's average. However, this depends, in the first instance, on discovering the attributes of backwardness specifically.

The Reserve Bank of India published in its Bulletin of June 1970 a statement drawn from a report of the Working Group of the Government of India of how the States stood in respect of various elements of the infra-structure as well as in the matter of employment in registered factories. The results are presented in Table II.

The last column in this case presents a somewhat different picture of differentials from that presented by *per capita* income data. Here, Punjab is passed by Gujarat, and the differentials are larger and more arbitrary. West Bengal emerges in a specially favourable light as does Tamil Nadu which follows: their figures are 1,282 and 1,236 respectively. This table is misleading in many respects. However, the *per capita* incomes in Table II are also of interest. It will be seen that the Punjab, between 1963-64 as in Table II and 1969-70 in Table I, doubled its *per capita* income. In the case of Tamil Nadu, income went up only by 50 per cent and, in the case of West Bengal, by just about 10 per cent. In other words, there has been not merely a change in the substantial differential but the progress made by the advanced States as against those in the average and the backward groups seems to be increasing. The crucial questions, therefore, for discussion are not only the extent of the differentials on the basis of *per capita* income as revealed in Table I but the reasons why the gap as revealed in figures in Table II and Table I should be steadily growing.

Two exercises have been undertaken in order to assess the elements believed to be central to the differentials in these States. One is a Statewise irrigation assessment linking income with the percentages of net areas sown with irrigation in the latest year available—which is 1967–68. It will be seen at once that three out of the five "advanced" States have a very high percentage of net areas irrigated while, except for Uttar Pradesh, no State in the "backward" group has an equally high area. Similarly, in the average States, irrigation does not help, the average for the five States being less than the all-India average. This position persists today, since the changes in irrigation ranking have been marginal in respect of the differentials between the States.

A second exercise of equal interest features the States in terms of a second parameter: net value added by manufacture. It will be seen that, in the five advanced States, the percentage contribution of manufacturing industries to the net domestic product was 10·74, but was particularly high in Maharashtra and Gujarat. In the "average" States, it was indicated that, although it was very high at 9·34 in the year 1967, it was lower than, or nearer the all-India average in four of the five States with only West Bengal pulling up the average. But in the "backward" States, Industry has notably failed to arrive, the average being about half of the all-India average although Bihar is not so far behind the country as a whole.

These two exercises suggest that the main cause of the backwardness of the States of the Indian Union is the current favourable position of the advanced States to be found in two major parameters. The percentage of the net sown area irrigated and the percentage contribution of manufacturing industries to the aggregate net domestic product explain much of the differentials when we relate the *per capita* net domestic product in each State with these two prime variables to estimate to what extent an increment in the net sown area irrigated and the net percentage contribution of manufacturing industries changes the structure of the net domestic product, a result full of theoretical interest emerges. In a first approximation, with a linear correlation, the equation* indicates that a rise in any State of one per cent of its net sown area irrigated will generate a rise of Rs. 4·06 in the *per capita* net domestic product while a rise of one per cent in its manufacturing industries' contribution to GNP would raise *per capita* income by Rs. 7.26. A combination of both — one per cent rise in the net sown area irrigated and one per cent rise in the contribution of industry — would give about Rs. 11·33 in GNP *per capita* or Rs. 113 in a decade. Thus a backward State with an income of Rs. 400 would improve its income by 2·5 per cent every year or roughly, irrespective of other factors in growth, 5 per cent overall with population rising at 2.5 per cent. A backward district could thus assume a "normal" rate of growth if its irrigated area and its net output from industry increased at one per cent per year. It could go faster if other areas made a significant growth contribution.

III. THE FEASIBILITY OF SUSTAINED IRRIGATION GROWTH—1972-1982

The question immediately arises if sustained growth of one per cent in net irrigated area is, for the large number of backward districts, a feasible physical and financial possibility. Over the long haul, irrigation in India over 20 years has moved up from about

* $Z = 382{\cdot}8 + 4{\cdot}06\,x + 7{\cdot}26\,y$; where z is *per capita* NDP at current prices in rupees per annum, x is per cent of the net sown area irrigated and y is the percentage contribution of manufactures to NDP.

22 million hectares to about 40 million hectares—which suggests a doubling in 20 years was possible. Authorities argue that both surface and under-ground irrigation can technically cover 80 million of India's 160 millions hectares, but the cost of doubling again would involve twice the physical job of the last 20 years and at least twice the cost per hectare irrigated, so that irrigation costs for 40 million hectares might be about Rs. 40,000 crores or Rs. 10,000 per hectare at current prices. It must be remembered that, in the case of both surface and underground water, the most favourable locations have already been tapped. However, as part of a rural works programme, where viability is secondary to employment, an expenditure of Rs. 1,000 crores per year on irrigation works is not excluded. However, it is obvious that even such a sum will not permit, in the most backward districts, a full exploitation of available irrigation potential. If all irrigation work were now confined to backward regions, it is possible that we could generate new income as in the decade 1961-72 and of the same order. This suggests a capital; output ratio of about 2:1 if the output is concentrated on the crops most responsive to irrigation. Irrigation is broady "viable" for all crops since irrigated land gives about three times the net return for the same crop when dry farmed. But since irrigation cannot increase by much more than 5 per cent in each decade for an average backward district, the rise in GNP *per capita* in that region is unlikely to exceed (on our formula) Rs. 20. Even if industry, medium and small-scale, also added seven points in its percentage contribution over the decade, only Rs. 50, there would be a leeway of something like Rs. 100 to be made up otherwise. This points to the fact that irrigation and industry, central as they have been in the past, are not adequate to relieve backwardness in the future. We need technologies both outside irrigated land and outside industry. To these, then, it is necessary to turn.

On the "services," not much need be said. In the morphology of all economic growth, the tertiary sector rises with the secondary sector but more rapidly. However, now with Social Justice translated into Education, Health and Nutrition and Welfare generally, the GNP contribution of services in backward areas could be twice as fast as Industry at least in its employment component. This is an area where employment is easier since jobs can be created to qualifications not necessarily viable in a productive sense. Redundant employment is a condition of the raising of backward areas.

IV. THE CASE FOR DRY FARMING

Consider now the technological possibilities of new varieties of dry farming as against older yields and the differential between irrigated and non-irrigated yields of dry crops. Table V below does not add up to a total answer; but it suggests that half the gifts of irrigation which yields a crop of between twice and three times the corresponding unirrigated yield can be supplied by a "dry" technology instead of the "water" input which has previously been our major productivity input in agriculture. The thesis is here advanced that working with dry farming on four times the area under irrigation can produce twice as much over a decade as currently: in other words, sustained rates of growth of dry farming in selected areas for each backward region, based on its soil, rainfall distribution and crop selection practices, can accomplish over the next decade what irrigation did in the last decade. Thus, one might say that the new technology can make up for irrigation gains lost to the extent of Rs. 2 *per capita* for every per cent of

the area in the State committed to new dry farming practices. In terms of a State with 75 dry farming areas (which is the average for India), this implies that, if the new methods covered half the dry area, an increase of Rs. 2×37.5= Rs. 75 can be obtained. This is all too rough and ready, but it suggests an entirely new prospect in backward districts. Here, they start with little handicaps and no prohibitive investment is involved. Conceivably, Rs. 500 crores a year would give a return over a decade of twice as much as that sum spent on irrigation could achieve. The dice, paradoxically therefore, now appear to favour the backward areas since the dividends from dry farming rank higher than those of equal expenditures on either irrigation or industry.

V. AN ILLUSTRATION OF THE MODEL FOR DHARMAPURI DISTRICT

There are various possibilities with existing technologies by which a combination of irrigation, industrialisation, dry farming and service creation in the education, health and nutrition and general welfare fields can be combined to accelerate growth, which is now slow, of India's backward areas. Much will depend on the degree of acceleration to be applied and the drive and dedication with which projects, both viable and non-viable, are brought to a successful conclusion. However, the technologies of growth now available in agriculture make the "gap" between the advanced and backward areas less terrifying if the will to throw both financial and personnel resources into the battle is backed by sound management. In that sense, the picture is far less bleak than the analysis of the high dividends of Irrigation and Industry in the sixties make it look. Much is yet unproved in the new dry farming technologies ; but no negative conclusion is inevitable. Some work done in the Dharmapuri district gives us positive hope that just such a cycle of change holds the key to India's major backward areas problem.

As Table 6 that follows shows, the Net Domestic Product of the Dharmapuri district is Rs. 81 crores currently. Of this, agriculture account for Rs. 55 crores, (68 per cent) industry Rs. 8 crores, (10 per cent) and services Rs. 16 crores. The contribution of livestock, fishery, etc. is Rs. 2 crores.

In agriculture, dry land accounts for 85 per cent of the total area, while irrigated land at 15 per cent can possibly be raised to 20 per cent. If the yield of dry land doubles, the remaining 80 per cent of the total cultivated area can contribute Rs. 70 crores in 1981 compared to Rs. 38 crores currently. On irrigated land, with only a 50 per cent rise in yields, the net value added can rise to Rs. 34 crores, double the current level.

With the residual primary sector and the teriary sector rising at the same rate as total NDP and industry rising at a quarter above that rate—no doubt with heavy employment-oriented investments—the 1981 level of total district income can double to Rs. 160 crores.

In 1981, the contribution of the different sectors to the total income will alter marginally, with the microbalance poised in favour of industry. The overall rise of 7 per cent per annum will ensure a 4.5 per cent rise in *per capita* income. At this rate, a drawing level with the surrounding district can, at long last, be considered a practical possibility.

TABLE I

Statewise per Capita Incomes. 1969—70 :

Advanced and Backward Regions.

Region/State (1)	*Population 1971 census* (2)	*Estimated net domestic product for 1969-70 at current prices* — *Aggregate* (3)	*Per capita* (4)
	IN MILLION RUPEES	IN MILLION RUPEES	IN RUPEES
Advanced States	**141·90**	**98,662**	**706**
Punjab	13·55	13,682	945
Haryana	10·04	7,781	788
Maharashtra	50·41	35,870	731
Gujarat	26·70	17,124	657
Tamil Nadu	41·20	24,205	601
Average States	**153·42**	**76,043**	**515**
Assam	14·96	8,166	545
Mysore	29·30	14,262	515
Andhra Pradesh	43·50	21,636	513
West Bengal	44·31	21,958	511
Kerala	21·35	10,021†	505†
Backward States	**234·05**	**1,05,251**	**471**
Madhya Pradesh	41.65	21,368	534
Uttar Pradesh	88·34	44,312	515
Rajasthan	25·77	11,632	480
Bihar	56·35	21,455	402*
Orissa	21·94	6,484†	325†
All-India	**547·95**	**3,14,320**	**594**

Footnotes : * Figure relates to the latest available year—1968-69 in this case.

† Figure relates to the latest available year—1967-68 in this case.

TABLE II

Indicators of Industrial Backwardness

Serial number	State	Per capita income (in rupees): Total on the basis of 3-year (1963-66) average at current prices	Per capita income (in rupees): Contribution by industry and mining (1964-65 at 1960-61) prices	Industrial workers engaged in registered factories per lakh of population (1965)	Per capita annual consumption of electricity in kwh.: 1965-66	Per capita annual consumption of electricity in kwh.: 1966-67	Length of surfaced roads in kms. March 1966: Per lakh of population	Length of surfaced roads in kms. March 1966: per 100 square kilometres of area	Length of railway lines in kms. (1967-68): Per lakh of population	Length of railway lines in kms. (1967-68): Per 1,000 square kilometres of area	Total of percentages of Cols. (3) to (5) and (7) to (11)
(1)	(1)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	Andhra Pradesh ...	386 (104)	15 (45)	636 (68)	31 (51)	30 (45)	70 (125)	10 (111)	12 (100)	17 (94)	692 (87)
2	Assam ...	393 (106)	44 (133)	579 (62)	8 (13)	10 (15)	37 (66)	4 (44)	16 (133)	11 (61)	620 (78)
3	Bihar ...	265 (71)	28 (85)	440 (47)	57 (93)	60 (91)	25 (45)	8 (89)	10 (83)	30 (167)	678 (85)
4	Gujarat ...	462 (124)	58 (176)	1,721 (184)	83 (136)	95 (144)	59 (105)	8 (89)	23 (192)	29 (161)	1,175 (147)
5	Haryana ...	445 (120)	N.A.	800 (86)	N.A.	57 (86)*	60 (107)	12 (133)	16 (133)	32 (178)	843 (120)
6	Jammu and Kashmir ...	302 (81)	N.A.	237 (25)	N.A.	35 (53)	69 (123)	1 (11)	Neg.	Neg.	293 (59)
7	Kerala ...	341 (92)	16 (48)	1,015 (109)	39 (64)	50 (76)	54 (96)	27 (300)	5 (42)	23 (128)	891 (111)
8	Madhya Pradesh ...	325 (87)	18 (55)	570 (61)	36 (59)	43 (65)	69 (123)	6 (67)	14 (117)	12 (67)	642 (80)
9	Maharashtra ...	478 (128)	81 (245)	2,055 (220)	106 (176)	117 (177)	62 (111)	9 (100)	11 (92)	17 (94)	1,167 (146)
10	Mysore ...	373 (100)	29 (88)	896 (96)	55 (90)	58 (88)	124 (222)	17 (189)	10 (83)	14 (78)	944 (118)
11	Nagaland ...	N.A.	N.A.	N.A.	N.A.	4 (6)	56 (100)	1 (11)	2 (17)	1 (6)	140 (28)
12	Orissa ...	306 (82)	20 (61)	337 (36)	79 (130)	73 (111)	46 (82)	6 (67)	9 (75)	11 (61)	575 (72)
13	Punjab ...	492 (133)	39† (118)	788 (84)	102 (167)	109† (165)	50 (89)	13 (144)	16 (133)	42 (233)	1,099 (137)
14	Rajasthan ...	314 (84)	10 (30)	316 (34)	21 (34)	21 (32)	74 (132)	5 (56)	23 (192)	16 (89)	649 (81)
15	Tamil Nadu ...	400 (108)	36 (109)	1,095 (117)	89 (146)	94 (142)	105 (188)	30 (333)	10 (83)	28 (156)	1,236 (154)
16	Uttar Pradesh ...	306 (82)	11 (33)	495 (53)	30 (50)	36 (55)	28 (50)	8 (89)	10 (83)	29 (161)	066 (76)
17	West Bengal ...	465 (125)	68 (206)	2,150 (230)	114 (187)	118 (179)	38 (68)	17 (189)	8 (67)	39 (218)	1,282 (160)
	All India	372 (100)	33 (100)	934 (100)	61 (100)	66 (100)	56 (100)	9 (100)	12 (100)	18 (100)	800 (100)

Source : *Reserve Bank of India Bulletin*, June 1970, pp. 983-984.

Original Source : *Identification of Backward Areas*, Report of the Working Group, Government of India, Planning Commission, February 1969. Original Sources as quoted by the Working Group are ;

Footnotes :
1. Cols. 3 and 4—Provisional estimates on comparable basis supplied by the C.S.O.
2. Cols. 5—Indian Labour Statistics (1968) and Population Projections of the Expert Committee, 1968.
3. Cols. 6 and 7—Public Electricity Supply Statistics (1968), Ministry of Irrigation and Power.
4. Cols. 8 and 9—Indian Transport Statistics (1968), Ministry of Transport and Shipping.
5. Cols. 10 and 11—Railway Board for railway lines.

Note : Figures in brackets are percentages to the all-India averages.

* Relates to 1967-68 as reported by the Haryana Electricity Board to the C.W. and P.C.

† Estimates for erstwhile Punjab.

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TABLE III

Statewise Irrigation and Foodgrains Production—1967–68

by Advanced and backward regions

Region/State		*Total (net) area irrigated 1967-68 in thousand hectares*	*Net area sown 1967-68 in thousand hectares*	*Net area sown that is also irrigated as percentage 2/3×100*	*Percentage share in all-India foodgrains production : 1967-70 average*
(1)		(2)	(3)	(4)	(5)
Advanced States :		**8,678**	**41,658**	**20·83**	**26·9**
1. Punjab	...	2,333	3,992	58·44	6.5
2. Haryana	...	1,132	3,514	32·21	4·0
3. Maharashtra	...	1,476	18,267	8·08	7.3
4. Gujarat	...	1.108	9,802	11·30	3·1
5. Tamil Nadu	...	2,629	6,083	43.22	6·0
Average States :		**6,672**	**31,445**	**21·22**	**23·3**
1. Assam (including Meghalaya)	...	612*	2,393	25·57	2·2
2. Mysore	...	1,082	9,987	10·83	5·4
3. Andhra Pradesh	...	3,089	11,367	27·18	7·4
4. Kerala	...	411	2,129	19·30	1·3
5. West Bengal	...	1,478†	5,569†	26·54	7·0
Backward States :		**11,653**	**64,634**	**18·03**	**46·9**
1. Madhya Pradesh	...	1,143	17,797	6·42	10·2
2. Uttar Pradesh	...	5,657	17,467	32·39	17·6
3. Rajasthan	...	1,865	15,097	12·35	5·3
4. Bihar	...	2,011	8,284	24·28	8·7
5. Orissa	...	977[3]	5,989[4]	16·31	5·1
All-India	...		**139,702**	**19·70**	**100·0**

Footnotes : * Relates to the latest available year that is, 1953–4 in this case.

† Relates to 1964–5, latest available.

[3] Relates to 1955–6, latest available.

[4] Relates to 1964–5, latest available.

TABLE IV

Statewise Net Value Added, 1967

ADVANCED AND BACKWARD AREAS

Region/State	*Value Added by manufacture (Manufacturing Industries) 1967*	*Estimated Net Domestic Product, 1967-68 (at current prices)*	*Percentage contribution of the manufacturing industries in the aggregate Net Domestic product 2/3×100*
(1)	(2)	(3)	(4)
	(RUPEES IN MILLIONS)	(RUPEES IN MILLIONS)	
Advanced States :	**9,126·5**	**85,016**	**10·74**
1. Punjab ...	343·1	11,135	3·08
2. Haryana ...	323·7	6,496	4.98
3. Maharashtra ...	5,038·0	31,248	16·12
4. Gujarat ...	1,653·3	15,731	10·51
5. Tamil Nadu (Madras) ...	1,768·4	20,406	8·67
Average States :	**6,588·1**	**70,523**	**9·34**
1. Assam ...	265·2	7,906	3.35
2. Mysore ...	963·2	12,407	7.76
3. Andhra Pradesh ...	618·1	19,604	3·15
4. West Bengal ...	4,045·0	20,585	19·65
5. Kerala ...	696·0	10,021	6·95
Backward States :	**3,396·4**	**1,00,565**	**3·38**
1. Madhya Pradesh ...	692·1	19,191	3·61
2. Uttar Pradesh ...	900·8	42,005	2·14
3. Rajasthan ...	325·6	11,391	2·87
4. Bihar ...	1,251·7	21,494	5·82
5. Orissa ...	226·2	6,484	3·49
All other States and Union Territories. ...	**386·0**	Not available.	
Total : All India ...	**19,497·0**	**2,86,330**	**6·81**

Source : *India Pocket-book of Economic Information* 1971, Department of Economic Affairs, Ministry of Finance, Government of India.

TABLE V

Differentials in Yields from Irrigated and Non-irrigated Lands in Tamil Nadu for Five Crops

Crop (1)	*Dry Land* (2)	*Wet Land* (3)	*Differential 2 : 3* (4)
Cholam (Sorghum Vulgare) ...	550	1,200	1 : 2·2
Cumbu Millet ...	600	1,500	1 : 2·5
Ragi ...	800	1,800	1 : 2·25
Groundnut ...	1,200*	2,600*	1 : 2·17
Cotton ...	100	500	1 : 5

* for bunch.

Source : *Economics of Dry Farming* in Tamil Nadu, Madras Institute of Development Studies

TABLE VI

Technological Possibilities of income—growth in Dharmapuri District : 1971-1981

(1)	*Net Domestic Product by Industrial Origin 1972* (2)	*Percentage to total* (3)	*N.D.P. in 1981, Technology Available* (4)	*Percentage to Total* (5)	Remarks (6)
	(RUPEES IN CRORES)				
Agriculture ... of which,	55	67·90	104	65·00	...
from irrigated land (15 per cent of total with 2·5 times productivity.)	17	20·99	34	21·25	20 per cent of total land: 50 per cent of rise in productivity.
from non-irrigated land (85 per cent.) ...	38	46·91	70	43·75	80 per cent of total land: 100 per cent rise in productivity.
Livestock, Fishery, etc. ...	2	2·47	4	3·50	Do.
Industry ...	8	9·88	20	12·50	Industry maintains its 10 per cent share plus 25 per cent rise in output.
Services, etc. ...	16	19·75	32	20·00	Tertiary sector rise at the same rate as district income.
Total ...	81	100·00	160	100·00	

Annual rate of rise in District income.

Annual rate of rise in *per capita* income.

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RESOURCES AND CONSTRAINTS

By

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Stagnation, Poverty and Recent Prosperity: The history of mankind reveals that mass poverty was the rule and affluence, a recent exception. *The Glory That Was Greece* was confined to philosophy and democracy. *The Splendour That Was Rome* was exemplified in military conquests and excellence in law. The pyramids of Egypt and the Taj Mahal of India are monuments of engineering skill and architectural grandeur and of human vanity and exploitation. In none of these or in the other civilizations was there any sustained economic progress. The lot of the overwhelming majority of the people through the ages was nothing but poverty and misery.

This prolonged stagnation and mass poverty persisted through the middle of the eighteenth century. Sustained economic progress began in a few countries only during the last two centuries—a short period in human existence. As of today, affluence is limited to a minority of the world population. The European countries, North America, Australia, and Japan are rich ; the rest of the world is poor.

Growth Consciousness: While poverty is as old as mankind, what is new is the emergence of growth consciousness all over the world and particularly in under-developed countries. The under-developed nations demand an escape from crushing poverty and improvement in their standards of living. Why do these people refuse to accept poverty after so many centuries of resignation? There are many reasons. The most important reason is the attainment of independence by the erstwhile colonies. Another is "the international demonstration effect". A third reason is the appearance of an alternative growth path, namely, development through planning.

When the colonial countries attained political independence after the Second World War, they found themselves in a very unenviable position of massive poverty. The initial claim that economic prosperity followed automatically in the wake of political independence, once that was won and imperialistic exploitation had been put an end to, was soon revealed to be untenable. The gap between the rich and the poor nations in terms of national and *per capita* incomes was widening even after the rich nations had ceased to exploit the poor countries. And this increasing gap was wrought into sharp focus through the international demonstration effect. The governments of many of the under-developed nations, spurred on by the rising expectations of their peoples, began to launch a series of economic programmes in order rapidly to increase the income level. The developed countries came to the aid of backward nations in some measure because of cold war rivalry, partly because "poverty anywhere is a threat to prosperity everywhere," and for the rest, for reasons of humanitarian considerations.

The Paths to Growth: The gravest of all questions concerning economic growth is the proper institutional set-up. From the eighteenth century till World War I, there was only one proven prescription for economic growth. And that was the path of free enter-

prise and the market system. Under this system, "growth just happened," "and it could not be helped". But since 1917 another prescription for growth has emerged in the form of communism and central planning. The communist countries proclaim that, through State ownership and direction of the means of production, a much higher growth rate could be achieved than was possible under capitalism. Believers in capitalism, however, argue that the truth is exactly the opposite. No definitive judgment can be pronounced on these rival claims on the basis of existing data. Some of the countries of "the third world" like India have set out on a path which is a mixture—at best, an admixture—of capitalism and communism (democracy, private and public enterprise, and planning). This has been hailed as a third route and probably the best route to economic growth. The exponents of the third route claim that they have struck the golden mean between the two extremes of unbridled capitalism and oppressive communism, and this policy will enable the country to grow fast at a high rate. Such a claim as regards growth has not yet been confirmed by facts, since communist China as well as capitalist Malaysia, Singapore, Thailand and Taiwan have all realised a higher growth rate than India.

Growth Rates in Advanced Countries : The people and the leaders of the developing nations are in a hurry and they want to achieve rapid and quick economic development and set high growth rates as targets. The experience of the developed countries in this regard will be of great relevance in judging whether these high growth rates can be attained.

The economic, social, and political conditions of Western Europe and the United States in their initial period of development were much more favourable for growth than they are today in under-developed countries. The *per capita* income of England in 1800 was higher than the *per capita* income of India now. Population growth rate was low in the developed countries during the initial stages of development, and these countries had entered a period of sustained growth before there took place any population explosion in these societies. They had also the advantage of low wage rates and high profits, and these were reinvested by a class of capitalists who believed in capital accumulation and not in conspicuous consumption.

Starting with all these initial advantages, the growth of the West was even so neither rapid nor spectacular. It was gradual and in some cases, it look half a century before it became permanent. During the past century, according to Kuznets, the G.N.P. has risen only by three to four per cent a year even among industrial nations which had achieved the most rapid rates of growth. In countries like Britain and Belgium, the growth rate was even less at two per cent.

R. W. Goldsmith has estimated that, over a period of 120 years (1839-1959), the annual average growth rate of real G.N.P. in the U.S. economy was 3.66 per cent, (compound) which meant that aggregate output doubled, on the average, every 19 years. Even at this low growth rate, real income in the U.S.A. increased by 32 times in less than a century (95 years). *Per capita* real G.N.P. grew at 1.64 per cent over this period ; that is to say, *per capita* income doubled every 43 years.[1]

1 R. W. GOLDSMITH : " Historical and Comparative Rates of Production. Productivity and Price," *Joint Economic Committee on Employment, Growth and Price Levels Hearing*, Part 2, p. 271.

The growth record of the Soviet Union over a shorter period has been better than the long-run performance of the United States. Ignoring the war years and the immediate post-war years as representing abnormal situations, let us consider the growth rates of the Soviet Union during the periods 1928-40, 1950-58, and 1958-62. The average annual growth rate of real total output during 1928-40 was modest at 4·2 per cent. The performance of the Soviet economy during 1950-58 was much more remarkable and G.N.P. rose at the rate of 7.2 per cent per annum. But growth sharply declined to 4·6 per cent during 1958-62. In the long-run, the Soviet growth rate may be higher or lower than that of the United States and no firm prediction is possible, since so many imponderables are involved in future growth, which, in many ways, will be more crucial than in the past.

It is important to note that Russia in 1917 was not a backward country; it was a partially developed country with a sound industrial base and an agricultural surplus which provided the basis for future planning.

GROWTH RATE IN INDIA

Starting from a disadvantageous position as regards economic, social and cultural conditions, India aims at a growth rate of 5 to 6 per cent a year as regards real G.N.P. In other words, we want to develop more rapidly than did the advanced countries over a longer duration. Can we do the same? Only the future can tell. If, however, we are determined, we ought to make a greater national effort than was made in the advanced countries at a corresponing stage.

What is the growth record of our country over the past years? The realised growth rate has not been more than 3 to 4 per cent per annum as against the target of 5 to 6 per cent. The gap between target and achievement has persisted throughout the last twenty years.

The actual growth rate has not, however, been much different from the long-run growth rate of the advanced nations. India's net national income increased by about 69 per cent between 1950-51 and 1964-65 or at a compound rate of 3·8 per cent per year. During the same period, ***per capita*** income in real terms increased by 2·8 per cent at an annual average rate of about 1·8 per cent. [2]

These growth rates are similar to the long-term growth rates of advanced countries; they are, however, lower than those of Malaysia, Singapore, Thailand and Taiwan where the economies remain largely unplanned. They are also lower than the growth rates of China where planning is " total ".

To sum up the above discussion, economic growth started late in human history and it was neither fast nor spectacular. The actual growth rate of India, though not equal to the target growth rate, compares favourably with the long-term growth rates of advanced countries. And this means that India could become rich but only after a long period of time comparable to that taken by the advanced countries. The prospect of achieving affluence after more than a century may be unacceptable to " men in a hurry ". The attempt to secure higher rates of growth through planning within a democratic

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2 *Fourth Five-Year Plan : A Draft Outline*, pp. 7-8.

framework has not so far been successful. These facts underline the futility of achieving rapid progress and of doubling *per capta* incomes within a short period unless past flaws in planning are rectified and a tremendous effort is put forth to raise the required resources.

RESOURCES AND OBJECTIVES

The question of the rate of growth was given considerable attention because the resources required depended mostly on the targeted growth rate and partly on the other objectives of planning. When the objectives of planning are several—all of which may be economically or socially desirable—some of them may be harmoniously related to one another, while others may be in conflict. When they are in conflict, achieving more of one objective may be possible only at the expense of achieving less of another. The simultaneous realisation of conflicting goals will require greater efforts and resources than are needed if the goals were complementary. All our plans, including the Perspective Plan for the State, seek to realize a plurality of objectives which are in conflict.

The seven aims of the Perspective Plan for Tamil Nadu are: (1) doubling of *per capita* real income; (2) achieving full employment; (3) eliminating the worst forms of poverty; (4) ensuring social justice; (5) accelerating the process of social change; (6) promoting cultural activities and community participation; and (7) decentralising planning.

Some would be inclined to treat aims five through seven as strategies rather than as objectives, and the remaining aims—one through four—may be summed up as growth with justice. Some of the objectives are in conflict and it is difficult to avoid such conflict if the several objectives are thought all equally desirable. The basic aim, however, is to double the *per capita* real income in 12 years, because the accomplishment of their aims depends largely on doubling real *per capita* income.

ESTIMATION OF RESOURCES

In order to estimate the resources needed to realize the contemplated growth rate, a rather simple and mechanistic technique is widely used. The marginal capital-output ratio is estimated for the economy and this ratio is assumed to be constant throughout the Plan-period. Suppose that the estimated capital-output ratio is two. Then, if the growth target is a 6 per cent annual increase in national income, the required rate of investment is 12 per cent (6% × 2) of the national income. In other words, the economy must save and invest 12 per cent of its national income in order to achieve a growth rate of six per cent. The absolute level of investment can be easily estimated, given the marginal capital-output ratio and the amount by which income will have to increase. Suppose the initial national income is Rs. 10,000 crores and the aim is to double it over a period of time, say, 10 years. To generate an additional income of Rs. 10,000 crores, an investment of Rs. 20,000 (Rs. 10,000 × 2) is required.

IMPORTANCE OF CAPITAL FORMATION

Most economists emphasize that capital accumulation is the key factor governing the rate of development. Capital accumulation means increases in physical assets, such as machinery, plant and equipment and transportation facilities. The process of capital

formation consists in the withdrawal of resources from current consumption and of devoting such resources towards the production of capital goods. This involves three acts: (1) increasing the volume of real savings, so that resources may be made available for investment; (2) collecting savings through financial institutions; and (3) the act of investing which commits resources to the production of capital stock.

The generally accepted view is that the under-developed countries can achieve sustained growth only by increasing their saving and investment ratio up to 15 to 20 per cent of their national income in the same manner as developed countries have done. Recently some of the economists have come to believe that the role of capital in economic development has been greatly exaggerated. Economic development takes place as a result of a combination of social, cultural, political, and economic changes. "It is often nearer the truth to say that capital is created in the process of development than that development is a function of capital."[3]

Moreover, in the under-developed countries, characterized by under-employment, traditional techniques and poor organisation of production, it is possible to raise output by improving the methods of production rather than by increasing capital. On the other hand, new capital may be wasted in imprudent directions or in poorly managed enterprises.

The case of Japan is often cited to illustrate that economic development can take place without much additional capital.

During the first two decades after the Meiji Restoration, the saving rate in Japan was not more than five per cent; but income increased rapidly at the rate of five per cent per annum. The increase in income and output was brought about by increased economic efficiency. In other words innovations of a type which did not require much capital were primarily responsible for the initial shift in the production function and Japan was thus able to escape from the "low-level equilibrium-trap."[4] Technical change has played a greater role than capital accumulation in the economic progress of the United States. Robert Solow has attributed 90 per cent of the increase in productivity to technical progress and 10 per cent to capital.[5]

Capital formation is, thus, neither the sole key to economic development nor even a sufficient condition. Yet capital formation is important because, as Solow himself admits, it is doubtful whether the degree of technical progress that occurred in the U.S. economy would have taken place without capital formation. As regards Japan, capital formation in the subsequent years was high which helped that country to achieve a higher growth rate than before.

CONSTRAINTS ON RESOURCES

It is really a Herculean task to raise resources to step up investment to a level of 15 to 20 per cent of the national income in order to reach the target growth rate of more

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3 P. T. Bauer and B.S. Yamey: *The Economics of Under-Developed Countries*, p. 127.

4 R. E. Nelson, "Growth Models and the Escape from the Low-Level Equilibrium Trap," *Economic Development and Cultural Change*, Vol. VIII, No. 4, Part I, July, 1960, pp. 378-88.

5 Robert M. Solow: "Technical Change and Aggregate Production Function," *Review of Economics and Statistics*, XXX IX, No. 3; pp. 313-20.

than six per cent, for there are a series of constraints restricting the nation's capacity to find adequate resources. The success of our efforts to mobilise adequate resources depends on our resourcefulness and willingness to overcome vicious circles and overcome the constraints.

POVERTY AND LOW CAPITAL FORMATION

One of the basic constraints on the ability of the people to save and invest is poverty. In the words of Nurkse: "On the supply side there is the small capacity to save in an under-developed country resulting from the low level of real income. The low real income is a reflection of low productivity which in its turn is largely due to lack of capital. The lack of capital is a result of the small capacity to save and so the circle is complete." This low-level equilibrium-trap, no doubt, contains elements of truth. It is not, however, an insurmountable obstacle to saving and capital formation. Historically all the countries, which are now advanced, were once poor. Yet they were able to save and invest. The vicious circle has been broken once and it could be done again. However low the *per capita* income, it is still possible to increase the rate of saving if the people are sufficiently determined to save. Moreover, the rate of saving or at least the rate of potential saving is not so much a function of *per capita* income as it is a function of income distribution. Studies made by S. J. Patel and by ECAFE show that the degree of income — inequality was more or less the same in advanced as they are in contemporary, under-developed societies. For instance, the share of property income is about 20 to 25 per cent of the total income in the United States, the United Kingdom and India. But whereas in the U.S. and the U.K. the people who receive property income save the bulk of it, their counter-parts in India fail to do so. "Although *per capita* income in India is low, the possible rate of savings does not have to be significantly lower than in the developed countries, for the proportion of the saving-generating income or gross property income, in both cases, is approximately the same. The low rate of productive investments in India may, therefore, be explained, not by a reference to the low average income, but the preponderance of "feudal" income (or property income), which, in the main, is sterile at present for furthering economic development." [6]

ATTITUDE OF THRIFT

It is a paradox that the people of an under-developed country like India are far less frugal than the people of the prosperous countries. As argued earlier, the contention that people are too poor to save cannot be accepted. Even poor people in India do not spend all their income on current consumption. They spend substantial amounts on elaborate marriage and funeral ceremonies. The rich people do the same and much more. They hoard their savings in the form of jewellery and precious metals. And people who have amassed fortunes by illegal means store their wealth in forms that can be closely guarded, easily hidden, and readily carried elsewhere. The international demonstration effect has further damaged the saving habits of the people.

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6 S. J. Patel: "The Distribution of the National Income of India, 1950—51." *The Indian Economic Review*, Vol. III, No. 1, February 1956, p. 11.

DEMOCRACY, EGALITARIANISM AND CAPITAL FORMATION

Capital formation was comparatively easy in developed countries in their early stages of development. Trade unions were either non-existent or were suppressed when they came into existence. The wage rates were kept at subsistence levels and the increases in profits arising out of increased productivity were reinvested and, thus, capital was accumulated. This has been the manner of the classical process of capital formation. Even Marx admitted that the capitalists were not interested in excessive conspicuous consumption. Their motto was : "Accumulate, accumulate !"

In the Soviet Union, there are, of course, no capitalists except perhaps the State, and there is no exploitation of man by man. But a high percentage of national income is devoted to capital formation and a corresponding fall in consumption affects both the low income and high income groups. The trade unions do not have the liberty to ask questions about equality or tax equity.

In our country, trade unions came into existence prior to the advent of economic development and they demand high wages from the capitalists many of whom, unlike the capitalists of advanced countries, indulge in excessive luxuries. Our nation has gone democratic and has become welfare-oriented before the cake was in the oven and had risen. Our ideals are excellent but they create formidable constraints on raising revenue for development. Our democracy must have the courage to take unpopular decisions and impose sacrifices on all excepting the very poor, if the nation is to achieve rapid economic progress. Popular governments must be bold enough to impose discipline on labour as well as on management. This is a challenge which must be met.

DEFENCE EXPENDITURE

Large defence expenditures divert a good deal of our scarce resources away from development purposes. If, luckily, enduring peace is fostered between our country and our hostile neighbours, viz., Pakistan and Red China, our resource position will vastly improve. Otherwise security will remain more important than the needs of development.

OTHER CONSTRAINTS

Lack of well-organised financial institutions, continuing inflation, and the losses incurred and the low rate of return earned by our public enterprises are additional constraints on our resource-raising capacity.

MOBILISATION OF RESOURCES

This paper does not attempt a comprehensive discussion of all the possible sources from which resources can be raised. The discussion will be confined mostly to taxation which is, doubtless, the most important source, and only a passing reference will be made to others.

MOBILISING IDLE LABOUR

In an under-developed nation such as India, labour is redundant in agriculture, and this excess labour is a potential and almost costless source of capital accumulation.

Since the marginal productivity of labour in agriculture is zero, or even negative, the withdrawal of a part of the labour force from agriculture will not reduce the output. And if these workers withdrawn from farm are put to work on roads, dams, schools, etc., new capital will be formed. In this case capital formation does not necessitate a reduction in consumption. Of course, materials and financial resources are required to construct public works. But if labour-intensive methods are adopted, the additional costs incurred on materials and equipment will be small. A tax may be levied on those that stay behind in agriculture. The farmers will pay the tax by selling the surplus food and the tax proceeds can be used to pay wages to the workers employed in public works, and these workers, hitherto engaged in agriculture, will buy the food sold by the farmers. The flows of money and food would just balance each other. This Nurksean method of capital formation is not altogether costless; but it is a low-cost method. An evaluation of the working of the Community Development Projects and extensive research on the extent of disguised unemployment in different parts of the country are, however, essential to assess the quantitative importance of this source of capital accumulation.

INCREASING VOLUNTARY SAVINGS

Voluntary savings is low in India and an increase in these savings can be generated only if people are willing to accept a reduction in consumption. As pointed out earlier, people spend a good deal of money on ceremonies and on hoards of gold because of the non-availability of other safe channels of investment. The government must undertake a massive propaganda and convince the people that they are frittering away their previous savings on unnecessary and unproductive ceremonies. Adequate and attractive institutional arrangements must be made and safe investment avenues must be established so that the savings, which are currently wasted, may be mobilised for productive investment. The above measures designed to increase voluntary savings are not likely to yield enough savings for investment. Hence the government will have to resort to forced or involuntary savings through taxation or compulsory lending.

TAXATION AND SAVING

It is an established fact that tax revenue as a percentage of national income is much lower in under-developed countries (with the exception of China) than in developed countries. In advanced countries tax revenue constitutes more than 30 per cent of the G.N.P. With a multiplicity of taxes and with a steeply progressive taxation, the proportion of tax revenue to national income in India works out to only about 9 per cent on an average for the period 1950–58 and this proportion is lower than that which prevails in many other under-developed societies. The present low-tax revenue as a percentage of national income indicates that there is considerable scope for additional taxation. It also implies that our tax structure must be reformed. Many experts agree that we can increase the proportion of national income taken up by taxes without unduly disturbing the economy. The government will have to decide how far the present can be sacrificed for the future and they should also decide on a target rate of saving. It is admittedly a difficult decision to make especially in a democracy.

ECONOMIC SURPLUS AS A TAX SOURCE

In the context of economic development, the most important and difficult task of a rational fiscal policy is to locate the sources on which taxes could be levied without undermining the incentive to work and save. Paul Baran has pointed out that there is a considerable amount of economic surplus which can be taxed and used for productive investment. A distinction is made between actual and potential economic surplus. Actual economic surplus is the excess of actual current income over actual current consumption. This excess represents a measure of capital formation. Potential economic surplus is " the difference between the output that could be produced in a given natural and technological environment with the help of employable productive resources, and what might be regarded as essential consumption. " [7] The concept of potential surplus is, by no means, novel. The classical economists have paid pointed attention to the need of efficient allocation of resources, and they have also insisted that unproductive consumption as well as unproductive investment must be avoided. Potential surplus, as defined above, exists everywhere — in under-developed as well as developed nations. The concept does mean that on the production side, the economy must operate on the production possibility frontier by eliminating inefficiency and by fully utilizing the available resources with the best of existing technology and that, on the consumption side, unnecessary and wasteful expenditures should be avoided, so that the surplus of production over consumption may be maximized. This surplus must be mobilised by taxation and productively and progressively invested. And when, as a result of such investment, the national income increases, the increase in income or the major part of it must be taxed and the proceeds invested to achieve further economic growth. To mobilise the economic surplus, new taxes must be levied and the rates of the existing taxes raised.

DIRECT TAXATION

The merits of direct taxation are well known and yet our main source of revenue is indirect taxes, not the direct ones. The income and wealth taxes in India have risen from 2.4 per cent of the national income in 1950-51 to a mere 3.0 per cent of the national income in 1970-71. On the other hand, indirect taxation has risen from 4.2 per cent of the national income in 1950-51 to 11 per cent in 1970-71.

The income-tax must certainly be progressive without being expropriatory so that a large part of the economic surplus may be re-appropriated for investment purposes. It is difficult to condone conspicuous consumption in the higher income brackets, while the great majority of the people are poor and the country subsists in dire and bare need of development. In its incidence as well as in its conception, the income-tax in our country is undoubtedly progressive ; but the income-tax law is not effectively enforced. The confiscatory rate at the higher levels of income is one of the major reasons for tax-evasion. "The narrow structure with its steep marginal rates of taxation which are confiscatory has made for the twin problems of tax evasion and a parallel economy run with black money. This double feature of tax evasion and unaccounted money and the magnitude of the problem is terrifying. In 1968-69 the tax evaded was computed at Rs. 470 crores against a taxable income of Rs. 1,400 crores. In that year the volume of concealed business

7 PAUL A. BARAN : *The Political Economy of Growth*, p. 83.

deals, the smuggling of gold and luxury articles, transactions in ***benami*** assets, the 'purchase' of licences, quotas and scarce raw materials, donations to political parties, payments as bribes and other corrupt practices and conspicuous consumption have been roughly estimated at Rs. 7,000 crores, with the proviso that it might actually well-exceed Rs. 14,000 crores. In other words, the equivalent of somewhere around 75 per cent of the direct tax revenue yields represent income on which tax has been evaded and the equivalent of a third of the G.N,P. constitutes the parallel economy." *

The passage cited above shows that, by strictly enforcing the income tax law and unearthing black money, the nation can gain substantial resources. But if we want to discourage the evils of tax evasion and black money, it is a wise policy to reform the income-tax law which, in its present form, cannot be effectively enforced. Soaking the rich too much has become counter-productive. The confiscatory rates on top-income levels must be abandoned and a greater percentage of people must be brought under the purview of income-tax law by reducing the taxable income.

AGRICULTURAL INCOME-TAX

Agriculture occupies a dominant position in the economy from the point of view of employment and its aggregate share in the national income. Its share of the national income is about 50 per cent; but its share in taxation is unduly low. While the urban manufacturing sector contributes Rs. 700 crores in taxation, the rural sector contributes a little over Rs. 100 crores in taxes.

A recent study made by the NCAER recommends the imposition of a progressive agricultural income-tax both as a compensatory and resource-mobilising measure. Such a tax is expected to yield a revenue of Rs. 500 crores. Two points are noteworthy as regards the imposition of a progressive agricultural income-tax. First, the administration of agricultural income-tax is likely to be both difficult and expensive. Second, the ceiling on land-holdings has reduced the tax-base of agricultural income.

INFLATION AS A SOURCE OF FINANCE

It may be true in principle that, under favourable circumstances, inflationary finance may reduce consumption and release resources for capital formation. But our experience with inflationary finance has been most unhappy. It has done little good and caused much damage.

FOREIGN AID

Whatever the importance of foreign aid to the development of backward countries, the fact is that it has in the years following the second World War reached maximum point and the curve is now swinging downwards towards a trough, and it will end before long. Self-reliance, even brought on by necessity, is a sound policy.

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* *Bulletin: Madras Development Seminar Series*, Vol. II, No. 5. May 1972, pp. 3-4.

PERSPECTIVE PLANNING AND ROLE OF UNIVERSITIES

By

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A long-term plan of development embodying specific programmes and policies is an essential pre-condition for successful planning for a country with deep-rooted social and economic problems. The long-term plan should provide for a general pattern of economic and social development which would take into consideration the needs and possibilities of different areas and harmonise these into an integrated endeavour for national advancement. To work out a long-term plan on these lines, there is need for close and continuous collaboration between various government bodies and leading institutions engaged in scientific, economic and social research.

A long-term perspective worked out in sufficient detail brings out the inter-dependence between the different sectors of the economy and helps in a clearer under-standing of possible obstacles to its growth. It also enables a developing country to take consistent and timely decisions regarding the optimum uses of its resources, economies of scale and location and regional distribution of economic activities. In an under-developed economy, there are numerous conflicts of a regional character which can be resolved only in terms of a long-term plan which knits different regions into a larger design of national development. In the absence of such perspective planning on a comprehensive scale, regional disparities and distortions are bound to arise in course of time, leading to social, economic and political imbalances and pressures.

FEATURES OF PERSPECTIVE PLANNING

The main features of perspective planning may be listed as follows :—

(a) Demographic computations :

(b) Hypotheses concerning the development of the growth rate of industry and agriculture and their material and man-power implications ;

(c) An appraisal, based on the data derived from demographic calculations, of the variants of educational and training possibilities of the population ;

(d) Analysis of the lines of current technical progress in the main branches of production and a description of their characteristics ;

(e) Drawing up from among the national economic accounts the man-power balance and examination of their major proportions ;

(f) Trend calculations to determine and quantify the inter-connections as between the fixed funds and production and man-power requirements.

(g) Drawing up of norms relating to "social development" based on scientific research and on international examples in order to set the level of the populations, require-ments, etc.

With a view to improving the quality of a perspective plan, it would be necessary to strengthen the quality of statistical and technical information available within the country. The right quantities of raw materials, intermediate products, machinery and essential services, such as power and transport, as well as the requisite trained personnel must be available at the proper time. Considerable amount of economic, technical and statistical analyses have, therefore, to be undertaken with a sense of urgency. The demand for goods and services by consumers at the end of each given period, the volume of outputs of different sectors of the economy, the study of inter-industry relations and investment requirements have to be collected and collated in a scientific manner. Thus, without tangibly improving the quality of our statistical material, it would not be possible to undertake advance planning with any degree of surety and precision.

Apart from statistics, man-power planning is another critical area where a long-term perspective will have to determine current decisions. The intake capacity in engineering and medical institutions is a case in point. Unless projections for various types of technical personnel are worked out in detail and well in advance, the implementation of various plans and programmes is likely to go awry. It is comparatively easy to set up an industrial unit with all the machines and equipment ready at hand. But it is quite difficult and time-consuming to train competent staff to man these industrial units with efficiency and success. Technical education, therefore, needs perspective planning spread over a fairly long period. If our calculations in this regard are either too conservative or too liberal, either the plans of economic development will not run smoothly on a continuing basis for want of adequate personnel, or there would be unemployment among trained young men, leading to great frustration.

In modern planning, the different sectors of the economy must necessarily work hand in hand. Otherwise, there is bound to be a wastage of scarce resources, time and energy. From this standpoint, the inter-dependence of agricultural and industrial development must be recognised clearly in any scheme of perspective planning. If agriculture is developed at the cost of industry, there is likely to be a glut in the market. If, on the other hand, industrial development is planned for at the cost of agriculture, the shortage of raw materials would hamper the growth of industries and create distortions in the economy. Furthermore, uneven development of the infra-structure, including power and transport, would inevitably lead to undue delays in implementation and an inexcusable waste of scarce resources. From all these angles, a fairly long-term perspective plan is the crying need of our times.

Planning and development, therefore, require projection work, so that the perspective may be evolved in both the public and private sectors. An operational research study undertaken by private firms may throw light on the roots of the trouble, viz., labour problems, marketing problems, etc. But rarely are these studies undertaken in any systematic basis in India to-day.

In an economy of shortages, the private sector is not compelled to look into such projections or evaluations; for large profits are the order of the day. Hence, demand forecasts and marketing problems are often neglected. In the public sector, though project evaluations and cost-benefit studies are made, they are often done in a perfunctory manner for the following reasons: *(a)* political bias; *(b)* administrators are not equipped for the task in view of their preoccupation with day-to-day routine.

In the field of natural or physical resources, research should take the form of techno-economic appraisals of the wealth of the State; land, water, forests, fisheries, animal husbandry, etc. The resource position changes from time to time under the impact of development and the extent of the application of science and technology brought to bear upon it. Therefore, periodic techno-economic surveys are necessary, requiring an inter-disciplinary approach. Moreover, man-power studies are important for the development of human resources as they are intimately connected with education, training, and employment problems.

In the field of fiscal resources, growth rates of various taxes in relation to income groups and changes in the structure of the economy, require constant study. The impact and incidence of various taxes on different sectors, their incentive to produce, their effect on consumption and the standard of living have to be studied. The fresh fiscal resources that can be mobilised, the savings potentials, the rate of growth of savings and the propensities for saving and income of different classes have to be assessed. Research has to be focussed on these matters. In the sphere of social welfare, the impact of family planning, the constraints to its successful implementation, the impact of various social welfare schemes on the backward classes and tribals have also to be studied. These take the form of socio-economic studies often calling for an inter-disciplinary approach as in the case of techno-economic studies.

ROLE OF UNIVERSITIES IN PERSPECTIVE PLANNING

Subjects of fundamental importance, viz., long-term perspectives such as the implications of social change for economic growth may be remitted to centres of higher learning for a basic appraisal. All the ideological implications as well as comparable instances in other countries of this requires time and also familiarity with the recent literature in all related disciplines of the subject. It is difficult for a business firm or a government department to get involved in this commitment.

The sectoral problems of planning may be assigned to Universities and research institutions on the basis of expertise they possess. The distribution of research studies to different centres of learning could be arranged by a Standing Committee of Experts from the Universities and research institutions which will also co-ordinate the work, avoiding duplication and unhealthy competition.

Planning, above all, is an art of the possible. It is a process, both political and social. Economic planning is only a part of larger social planning and the one cannot succeed without the other. But our planners in the past have ignored the macro-balance in the economy, framed the plans with a monetary bias, neglected the physical inter-dependences and balances and have largely ignored political and social factors.

The course of planning in this country has made us painfully conscious of the disparity between plan and performance. There is a yawning gap between the two. Closing the gap requires new actions and formulations of propositions, which are realistic with respect to the specific relationships of the economy. Hence, the lines of economic progress for the country lie in resolving the awkward problems posed to the country

during the Plan period. All this means that the perspectives of planning for the country should promote dynamic situations in an otherwise static society. The bane of the official programmes in the past has been the failure to take into account the reality of the situations in the country. In this static society continuous economic progress can be promoted only if forces are generated for effecting changes of the static order. These changes can be brought about to some extent by compulsion, and to a large extent, by persuasion.

The University men constitute the elite of the country. Through them an atmosphere of liberalism and academic independence pervades the University. If these academicians are enlisted to assess the Plan periodically and are allowed to participate in the formulation of the plans, a welcome change will come about in the country; instead of plans and its ideals blowing over a static crust, it will permeate through the layers of society "initiating a process of dynamic growth".

W. MALENBAUM : Prospects of Indian Development

RESOURCES AND CONSTRAINTS

By

THIRU S. VENKITRAMANAN I.A.S.

Secretary to Government, Department of Finance, Goverment of Tamil Nadu.

A Civil Servant, especially a generalist like me, hesitates to express his views on an economic matter of such importance as resources and constraints. However, from the beginning of the social system, civil servants under some guise or other have been necessary. And so, it is perhaps appropriate to project the view point of civil servant before this august gathering of economists and planning experts. There may be some validity in the experience of an administrator which may be relevant to the theory and practice of planning.

2. By temperament and tradition, Finance Departments are inclined to look at the problem of resources as the main constraint for development. How to manage with scarce resources is the perennial problem of economic administrators. The adjustments of priorities between and within sectors reflect the scarcity of resources which is a prime constraint on our development. It is quite true that when we look over the long haul at economic development, the constraint on resources may cease to be the binding one. Very often, development itself breaks this constraint. Additional mobilisation of resources becomes possible precisely because of development of infrastructure and the consequent induction of new industries. The eternal argument of what comes first, resources or development, becomes translated in the language of jargon into forward and backward linkages.

3. As planners interested over the years in the job of formulating budgets and plans from year to year and over a longer span, we have to continually learn from the lessons of the past in forecasting the future. The turnout of figures may not be as pessimistic as one visualises it at the beginning of a plan. There is the equally familiar experience that one might overshoot the available resources if one tends to carry this lesson too far. But one essential lesson of forecasting experience is that biases are conservative. The process of estimation itself, based as it is on hunches and inadequate data sometimes leads us to underplay the possibilities of development. Even when concerned with the short span of time which is usually the budget period, one tends to under-estimate resources and as a result constrain development. Much more marked is the tendency to so under-estimate resources when we talk of the long-term perspective. The built in bias of the financial planner is justified by the lurking fear that while resources go up by stairs, expenditure commitments go up by the lift. However armed one is to the hilt, with data related to past trends and future projections of production is, estimates tend to be on the lower side so far as the resources are concerned. Quite often, the conservative planner points out that the worst of his prophesies have turned out to be true. One of the problems in perspective planning is the difficulty of forecasting on the basis of inadequacy of data. Continuous efforts are needed to derive correlation between the variables such as tax receipts, State income, inter-State trade flows, etc. An effort is being made in this connection within State of Tamil Nadu.

4. Although in absolute terms, a conservative estimate of receipts from taxes may have been bettered, receipts may have improved mainly on the basis of higher prices and the effective content of a given magnitude of plan effort turns out to be less. While this may be so, I believe that the overall experience of the country over the last twenty years leads one to the conclusion that it is much better to strain the country's resources and stretch the capabilities to the maximum and leave no slack rather than to assume limited resources on a conservative basis and plan for a lower target. The very fact that we strain our resources leads us to strive for newer methods and adopt newer technologies to get over the bottlenecks that arise.

5. Turning from the general to the particular, I would point out that State Governments as a class have a relatively low resource base. For one thing, their tax efforts have to be confined to the Sales Taxes and Land Revenue. Land Revenue is relatively inflexible, what with availability of land being limited, Agricultural Income Tax seems to be politically sensitive. Sales Taxes have their own limitations in the context of the need to control inflation. The really responsive tools of taxation such as Income Tax and Excises are in the hands of the Centre. The resource estimation on the part of the State therefore consists of second-guessing what price trends would be like and what volume-changes will influence the turnover in trade. The so-called buoyancy of Sales Taxes is the reflection of both volume-changes and price-changes. The latter factor contributes as much to enhancement of the expenditure as receipt. The symmetry of the effect of inflation is often lost sight of by the elasticity optimists among forecasters. One always hopes for built-in cushions in the revenue estimates to counter the 'excluded shocks' of expenditure increases.

6. Difficulties of forecasting accurately may lead one to unexpected gaps in resources during a plan period. But, should this mean that essential national projects in the State sector should be dependent on yearwise allocations? Most of the plans of State Governments are concerned with development of infrastructure such as power and roads. Development of power, for instance, is a costly business and has a long gestation process. Generation and transmission projects are highly capital-intensive. Power has necessarily to be provided. But prevalent financing arrangements are such that States will not be able to get the benefit of continuity of assistance which is assured to industry and to agriculture. While a major fertiliser plant once approved by financing institutions can go ahead fearless of any lack of liquidity of resources, power projects have to depend on the whims and fancies of the State financial situation. It seems to us that there should be a project approach atleast to generation programmes in the power sector. The same applies to the bigger irrigation projects. Time is a scarce resource and early completion of core projects will substantially improve the flow of financial resources over the period as a whole. If we are to compress time, we have to ensure the continuous inflow of resources to all important projects. On the national plane, it appears desirable to pursue the idea of project aid for the larger projects in the sectors on power, irrigation, water supply and other such infrastructural areas so that once the need for such a project is decided, the maximum benefit can flow in a minimum time.

7. Some of the constraints that arise in the development of our resources are man-made. We have already referred to the need to accelerate the programme of power development. The time taken in clearing programmes for even the core sector is very

long. Even after such clearances are given, it becomes a very difficult task to obtain necessary raw materials such as steel and equipment for these projects. If a few core projects are identified as important, there should be no hesitation in removing all constraints and making available of necessary raw materials even if it be on the basis of imports. Unless this is done, we would lose valuable time and therefore further opportunities to raise resources. An instance in point can be drawn from a related sector, viz., the construction of fertiliser plant. If, on the ostensible justification that we have to encourage indigenous manufacture, we delay by one year the construction of a plant of say, 200,000 tonnes of nitrogen capacity, the foreign exchange lost because of the consequential imports of fertilisers during that year would more than offset the illusory benefit of import substitution. The constraints of raw materials and equipment have therefore to be systematically analysed and the time spent on our development shortened in order to exploit our potential to the maximum extent. 'One step backwards two steps forwards' may be a useful slogan to adopt in respect of core sector programmes.

8. We have necessarily to identify what are and what are not critical areas in our development programmes. Those areas which are core and are critical have to be assigned the maximum resources in terms of rupees and foreign exchange. This is the real meaning of a crash programme. Once a national decision is taken that a project is vital, there should be no hesitation in pumping rupee on foreign exchange resoures within the shortest possible time. It would be also useful to conceive of the managerial device of 'expediters' to pursue the task of breaking up of bottlenecks in this regard. Expediters who can be charged with and given the responsibility to break constraints at the highest level are needed in respect of every core project. They should be asked to continually monitor the project, identify the causes of delay and be authorised to operate at the highest level in the country to secure administrative and political decisions to hasten the project. These expediters may be technocrats, bureaucrats or others. But what is essential is that they should be people aware of the multiple level impacts of decisions and indecisions.

9. This becomes particularly important when we have to deal with concepts like capital output ratio. If the utilisation of existing capital becomes better, to that extent the capital output ratio will improve. In fact, in any period in which we are planning a growth of income, what may be important is not new investments so much as the effective utilisation of older investments. The application of incremental capital-output ratios to the injections of capital during a perspective plan may have limited relevance if the projects contemplated which have long time spans go through teething troubles. Therefore, if, during the periods of the respective plan, substantial additional incomes have to be generated in the State, they can more easily come about by better utilisation of capital both in industry and in agriculture. Equally importantly, technological changes may have an important role to play in altering capital output ratios. For instance, the introduction of high-yielding varieties changed the output very markedly in the Punjab and Haryana during the sixties, notwithstanding the fact that the injection of fixed capital was not there to a marked extent. Reduction of inventories and introduction of additional shifts are methods which could improve utilisation of a given capital base and thus increase the flow of income within the economy. One other instance in point which comes to our mind is the reduction of transmission losses in electrical systems. This could be a substantial generator of additional 'resource' in the country. The current

theories of planning do not give much emphasis to this partly because of the high place given to investment in capital foods as a desirable objective in itself.

10. Another aspect of planning experience which has been becoming increasingly relevant is that of the distinction between plan and non-plan resources. In the total development effort of the country, the plan is only a part. Especially in State budgets, the plan is only about 1/3 to 1/4 of the total activity undertaken. Marginalism, in the sense of concentration on activities at the margin, has dictated a considerable diversion of attention to scrutiny of plan activities ignoring the large base of development. This is particularly true in respect of the social services sector. The education plan of Tamil Nadu is scarcely Rs. 10 crores while the total outlay is nearly Rs. 90 crores. Shortage of resources dictates the imperative need of a total activity approach to this sector so that we concentrate on all outlays instead of those only at the margin.

PEOPLE'S PARTICIPATION IN PERSPECTIVE PLANNING

By

V. KRISHNAMURTI

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1.1 *Retrospect:* Planning — local, regional or national — has necessarily to be economic and social in India today. It broadly becomes perspective when there ensues an equation between the current needs of a community in an area and its presently available resources (men, material and time) on the one hand, and its future needs and the prospective resources on the other. The solution of the equation should have for its cinal objective the economic and social betterment of the community which would act as a growth-centre for further development.

1.2 Perspective planning assumes a new look when local bodies, especially under a scheme such as Panchayati Raj, come to be entrusted with rural planning, development and administration. They interact to mutual benefit, the one strengthening local capacity to formulate plans at the grass-root level through people's participation, and the other stimulating the growth of an infra-structure for further planned development through democratic means.

1.3 Mahatma Gandhi wanted India's economy to be built from below: "My idea of Village Swaraj is that it is a complete republic, independent of its neighbours for its vital wants and yet interdependent for many others in which dependence is a necessity. Thus the village's first concern will be to grow its own food-crops and cotton for its cloth. It should have a reserve for its cattle, recreation and playground for its adults and children. The village will maintain a village theatre, school and public hall. It will have its own waterworks ensuring a clean water supply. Education will be compulsory up to the final basic course. As far as possible every activity will be conducted on a co-operative basis. There will be no castes, such as we have today with their graded untouchability... ...... The government of the village will be conducted by the panchayat of five persons annually elected by the adult villagers, male and female, possessing the minimum prescribed qualifications. This will have all the authority and jurisdiction required. Since there will be no system of punishments in the accepted sense, this panchayat will be the legislature, judiciary and executive combined . . . . Here there is perfect democracy based on individual freedom. The individual is the architect of his own Government." At long last, after about two decades of economic planning, the Central Planning Commission has come back to the starting point of Gandhian planning—the villages, the panchayats—as is illustrated by the recent utterances of the Central Planning Minister. He said in Parliament that he was all for planning from the "manageable rural unit" of a village or block as the foundation of the plan edifice. "Let us take the bitter lessons of the past and begin the process of planning from below." But we have been toying with centralised planning and decentralisation of administration though they are contradictory to each other. India is essentially a country of villages that are today change-prone towards democracy and development which cannot be achieved without decentralised and democratic planning. The main reason why the benefits of development and welfare

programmes do not become equitably distributed among the people* in the result is the slender emphasis on regional and area growth which, when secured through proper co-ordination at the inter-regional level and at the higher agencies of planning, would deliver the goods in the shape of a better life in the rural community with an irreducible modicum of adequate protected water supply, sanitation, housing and health facilities, and the like. It is but right that the local bodies should participate in planning and development. Planning from the grass-roots is possible only when there is self-government at the grass-root level and satisfaction of the felt needs and aspirations of rural folks.

1.4 A Study Team of the Community Development and National Extension Service (Balwantrai Mehta Committee, 1957) which was asked by the Government of India to study all facts of our Community Development Programme found *inter alia* that most of the local bodies did not evidence enthusiasm or involvement. The team found that "an attempt has been made to harness local initiative through the formation of *ad hoc* bodies mostly with nominated personnel and invariably advisory in character. These bodies have so far given no indication of durable strength nor the leadership necessary to provide the motive force for continuing the improvement of economic and social conditions in rural areas." It came to the conclusion that "so long as we do not discover or create a representative and democratic institution which will supply the local interest, supervision and care necessary to ensure expenditure of money on local objects which conform with the needs and interests of the locality, invest it with adequate powers, etc., we will never be able to evoke local interest and excite local initiative in the field of development." And in its search of a vigorous democracy, it recommended devolution of function and of financial and other powers in the matter of rural development and welfare. In the three tiers of Panchayati Raj, the Government may reserve to itself the functions of guidance, supervision and higher planning. Panchayati Raj was called into existence to implement the community development programme through democratic decentralization. Thus local bodies came to assume an enhanced role in development planning and implementation and the rural community arrived at another stage in its quest for Swaraj which is based on the Gandhian *dictum* and rationale that Man is the master of his destiny.

LOCUS OF LOCAL ASPIRATION AND DEVELOPMENT EFFORT

2.1 Community organisation has received little attention so far in development planning. The primary need of local planning is the correlation and adjustment between social welfare needs and social welfare resources in a given geographical area both for the present as well as for the future; this presupposes a balanced use of material and human resources through co-operative activity for the social good of the rural community. The local people should become imbued with the motive force for planning and action at the grass-root level, and the local bodies representing the will, aspirations and goals of the people should constitute the dynamo generating this motivating energy. This belief has been further strengthened by our own experience of working with people in the villages and from our investigations which have sought to understand and assess the involvement of the people in programme planning and implementation. Our study (1961) of the

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* That there has been variance in the distribution of benefits accruing from community development and of high-yielding varieties is shown by evaluative and other studies conducted by the Research Department of the Rural Institute, Gandhigram, Madurai District, Tamil Nadu.

Village Production Plan in the Athoor Panchayat Union evidences a 'low' awareness of the plan even among progressive farmers as well as 'low' involvement. The local bodies who are the agencies of development are the hub of change and of the local communities who constitute the target system. The flow-set, based on this concept, of activity co-operatively motivated towards development of the area and so sustained can be set forth as under:

Change System	⇄	Local bodies	⇄	Target system
Panchayat Union, D.D.C. and Government or appropriate agency of change		P. R. institutions		People

2.2. In the actual operation of this system today, the problem of co-ordination with and assistance from the higher tiers looms large at the local body level, due partly to red tapism, lack of development-orientation, field experience in terms of local needs, etc. The problem also manifests itself at the target-system level in the failure to activate people in the requisite degree towards an acceptance of desirable changes and to harness human and material resources in the service of desired changes. The economic inabilities in the "target system" to receive facilities and to contribute towards community development and social disabilities, characterised by illiteracy and caste, also act as barriers to social action. Incidentally all this affects the quality and pace of social change. It tends to lose direction as planning ceases to be pyramidal and *pointu*—and not built up from below and brought to a head as it ought to be.

3.1. Let us examine whether the existing local bodies in the rural areas are entrusted with the power of planning as it bears on rural development and welfare.

3.2. Whatever may be the form of Government, democratic or dictatorial, unitary or federal, parliamentary or presidential, it is utopian to formulate plans at one point. In a federal system, plans have to be formulated at three levels—the local, State and national. India has a quasi-federal constitution and it is therefore natural that plans, programmes, projects and schemes have to be formulated at these three levels. Since Panchayati Raj institutions are entrusted with rural development and welfare administration in addition to their routine municipal or civic function, the physical and financial targets, priorities, etc., pertaining to rural development and welfare programmes are decided on by the Central and State Governments. In other words, the Central Government have the power to lay down policies and programmes, to allocate funds, to direct, guide and co-ordinate the community development programme throughout the country; but the actual implementation of the programme is the responsibility of the State Governments who will act through the Panchayati Raj institutions, Panchayati Raj being a State subject. The existing Panchayati bodies act mostly as agents of the State Government in rural development. The State Government breaks down the State-level targets to the level of the District Development Council associating its departmental heads in its endeavours. The Development Officers who are stationed at the district headquarters

are required further to break down the financial and physical targets to the Panchayat Union level. In this process of dividing and sub-dividing the physical and financial targets, the officials have an important role to play in persuading the elected non-officials to accept and approve the targets in the light of felt needs, the problems of plan implementation and the resources available to the local community. The Panchayat Union has to formulate its schemes or to plan the priorities and programmes in the light of the local situation. Under the existing usage, the non-officials of Panchayati Raj have to discuss the schemes put forward for inclusion in the plan, fix targets for approved schemes and to budget for them within the available resources. The main object of Panchayati Raj is thus to involve the non-officials (people's representatives) in the task of development so that they may be fitted and enabled to play their rightful roles. But in the emerging pattern of Panchayati Raj, the role of local bodies in the planning of rural development and welfare has been limited. If perspective planning is to succeed, the conferment of benefits from on high has to be replaced by a system that seeks to enthuse the people and enlist their participation.

3.3. *People's Participation and Local Bodies*: Panchayati Raj is an attempt to establish direct and participative democracy below the level of the constituent States of the Union, as local institutions are best able and equipped to reflect the felt needs, wishes and aspirations of the people.

3.4. The Community Development Programme has hitherto been formulated and implemented by the official which has led to its being facetiously described 'as the Government's programme with Government participation'. It is said that, without the whole-hearted participation and co-operation of the people through local bodies in both the formulation and implementation of development plans, no progress of the community in the real sense could come about. There is a growing realization that people's participation in Government and development through local bodies is liberal education in a class by itself. So the programme has sought in the main to set up a strong motivation in the local community towards integrated development by means of self-rule through the agency of Panchayat institutions. A readiness to share responsibility for the affairs of the community alone can transform a representative democracy into a participative democracy. It is, therefore, imperative that the people, to whose welfare the community development programme is addressed, should be involved in the formulation of plans.

People's interest in local bodies has been proverbially waning. In the words of G. D. H. Cole, "drains and dustbins are not exciting things except when the drains get blocked up or the dust-bins remain unemptied and begin to stink". * Yet there is already some semblance of people's participation but what is required today is to find out whether the changed institutional structure following decentralisation has been found adequate for original planning as well as extension work.

3.5 Participation is the crucial member in this edifice of perspective planning we seek to put up for purposes of development. The whole philosophy of it is based on the simple and self-evident assumption that a centralized government machinery located

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* G.D.H. COLE, *Local and Regional Government*, p. 41.

at far away State head-quarters, no matter how big and efficient, is not adequate unto itself and is not equipped exclusively and pre-emptively to achieve the economic and social aims implicit in a better and a richer life for the masses of our people in the rural areas.

3.6. It is assumed and the assumption is justified in fair measure that communities develop their own capacity to deal with their problems, present and future. People must learn participative skills in a democracy because unless they take part in the affairs of government, share responsibility and create the supporting institutions materially and in spirit, democracy will fall apart. The basic plank of community development is and ought, therefore, to be the growth of the democratic idea. Democracy does not function unless there is a decentralisation of powers.

3.7. The idea in people's participation is to involve them and their elected representatives and leaders in every community or plan activity so that, through their participation, contribution or sharing, they develop a sense of involvement, a sense of achievement and pride ; then, their plans, programmes and follow-up action largely become their own. In other words, it is functional and participative democracy through which are built the cohesiveness, solidarity, self-reliance and self-confidence of the local community. Simultaneously, local talent and leadership are also fostered.

3.8. There are two aspects of people's participation : one is their contributions of cash, goods and labour to the official community projects programme at village level : for example, the construction of school-buildings *balwadis*, the laying of a road, the sinking of drinking water wells, organising community centres. The second concerns the people's direct participation in the deliberative proceedings of the institutional Panchayati hierarchy, in the formulation of policies, in decision-making and in the implementation of planned programmes.

3.9. The objective of people's participation can only be fulfilled through the proper co-ordination of individual and social effort, in the full utilisation of the potential for self-government and development at the Panchayat level, at that of the statutory bodies in the upper reaches, at the village co-operative, the school and other associated organisations such as Farmers' Forums, Youth Clubs, Madhar Sanghams, etc. Wherever they function. they ought to harmonize individual needs with group needs and group needs with national needs. In a successful system, this complex of rights and duties never becomes antinomian. It is when these are exercised intelligently and conscientiously in the pursuit of chosen objectives through Panchayati Raj institutions that the vital links between the various levels of planning are forged and become effective in use. Panchayati Raj bodies have been functioning in most States during the last ten years. It is desirable that a study is made of the degree of participation and extent of involvement of the local bodies in programme planning and programme implementation ; only then can we be reassured of the degree and success of local bodies' participation in the planning and execution of schemes.

3.10. But a crude assessment is that it has been the official at the Panchayat Union and District Development Council levels who has played the major role in formulating

and shaping plans; it is still the official who takes the lead and who appears to be the prime mover at the ground level. He is not to be blamed; he is not to be replaced, but the people's elected representatives should share the work with him, become his partners and gradually make themselves the architects of planning at the lower levels the officials playing the role of a guide and friend or a specialist. It means power to the people's representatives (local bodies); it means training for development, an opportunity to commit mistakes. It means the provision of institutional arrangements to rectify them and improve their participative skills and their efficiency in governing themselves, in accomplishing things at their level. It above all means a planned, intensive and appropriate social education programme for the people and more so for their elected representatives.

"MODUS OPERANDI" OF PARTICIPATION

4.1. In this context, the strategy for village work, evolved through our experience of more than 15 years at the Gandhigram Rural Institute involving local bodies and specialists, is really relevant, even if it appears like stretching a point. The various steps are as under:

(*a*) Fact-finding about the *status quo*, about the condition of the people, the availability of resources, etc.

(*b*) Leadership survey in the villages with a view to identifying dynamic talent;

(*c*) The views of the village assembly regarding conditions of the village and its needs as elicited from its deliberations. The officials/non-officials/specialists of the Panchayat Union/Panchayats are invited to participate in a meeting. A comparison of the points of the discussion with those of the surveys is then made;

(*d*) The constitution of a Village Committee;

(*e*) A broad consensus on needs and priorities as it emerges from the discussions of the village committee;

(*f*) Execution of planned projects in the light of the local resources—men and material and their availability for the projects. Assistance of local bodies and the village committee in mobilizing these.

Ours has been a micro-effort and modest one since our service area is small but it promises all manner of possibilities for its wider application *mutatis mutandis*.

4.2. There are certain negative as well as positive factors that have added to the demand for people's participation in planning and development. The role and purview of the Central and State Governments are daily increasing which have served to confine planning and implementation work largely in the manner of their own choice to social matters particularly. Besides, the increasing ramifications of Central and State Governments' machinery become concerned with routine work; they have become systematized without place for individual aspirations however valid and representative. All this renders it difficult for a limited body of officials to meet with people and function in close contact and due consultation. In the absence of consultation and involvement either through

direct contact or through the elected and traditional leadership and local bodies in planning, the gap between the Government and the people will be widened leading to unilateral decisions in economic and social matters which are of vital import to the community.

LOOKING AHEAD

5.1. Perspective planning looks towards the future in hope with its feet firmly planted in present realities. The participation of local bodies in it could become effective if aided by the three following factors :

1 The construction of a realistic target-system as it concerns human, organisational, technical and financial resources available and the goals in view, both global and sector-wise ;

2 Formulation of a working plan for an area, which is achievement-oriented and in which the local bodies, rural, social and economic institutions and the people themselves, are the lynchpins so that reasonable results can be obtained at each step.

3 Execution of the plan in perspective, year by year, through the integration of the basic plans into the administrative work of the State and through timely and improved co-ordination between different agencies and local bodies.

Such an approach, which was lacking in the past and has been a stumbling block in implementation and achievement of plan goals, will provide the much wanted sense of purpose and direction; for where there is no purpose, planning plucks and where there is no direction, perspective pines. Perspective planning will thereafter cease to be a process of piecing together the allotments and targets proposed by a variety of agencies—official and non-official.

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The aim of the Institute is to contribute to the economic and social development in Tamil Nadu and India.

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- Studies and action-oriented research in micro-development problems ;
- Documentation and library service in development programmes ;
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